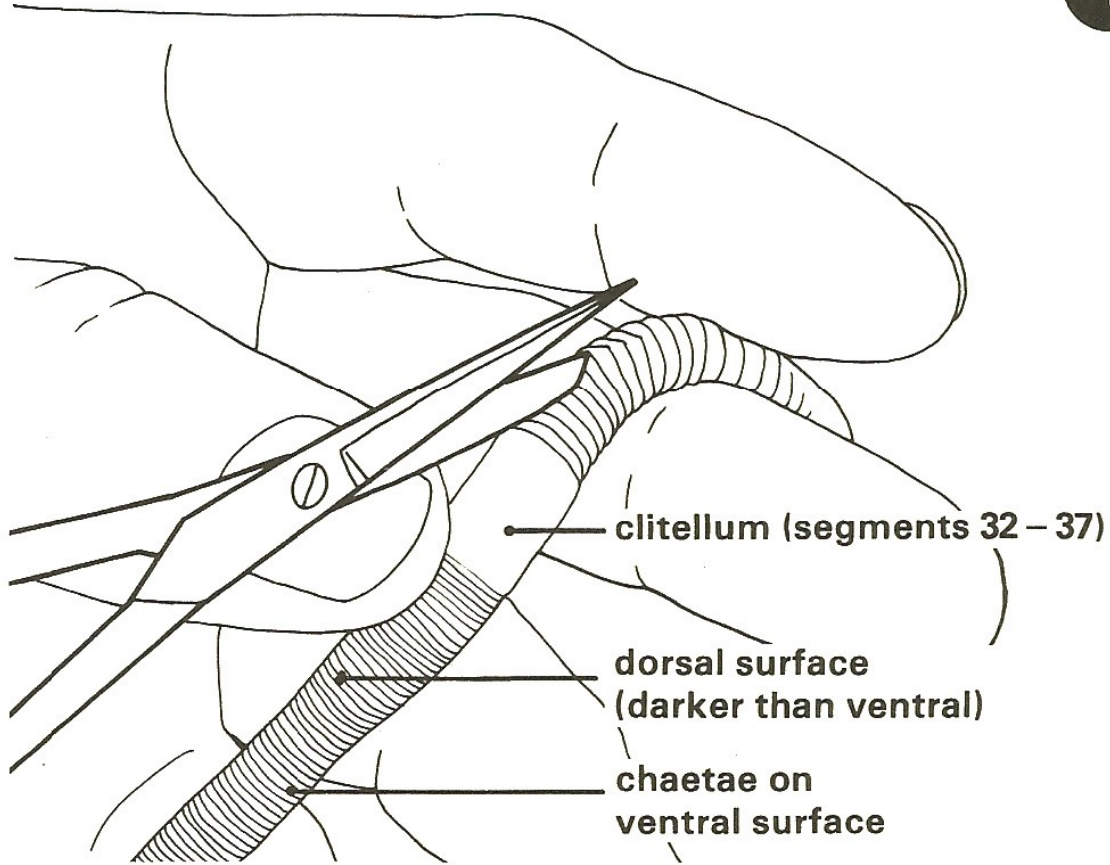


INVERTEBRATE DISSECTION GUIDE

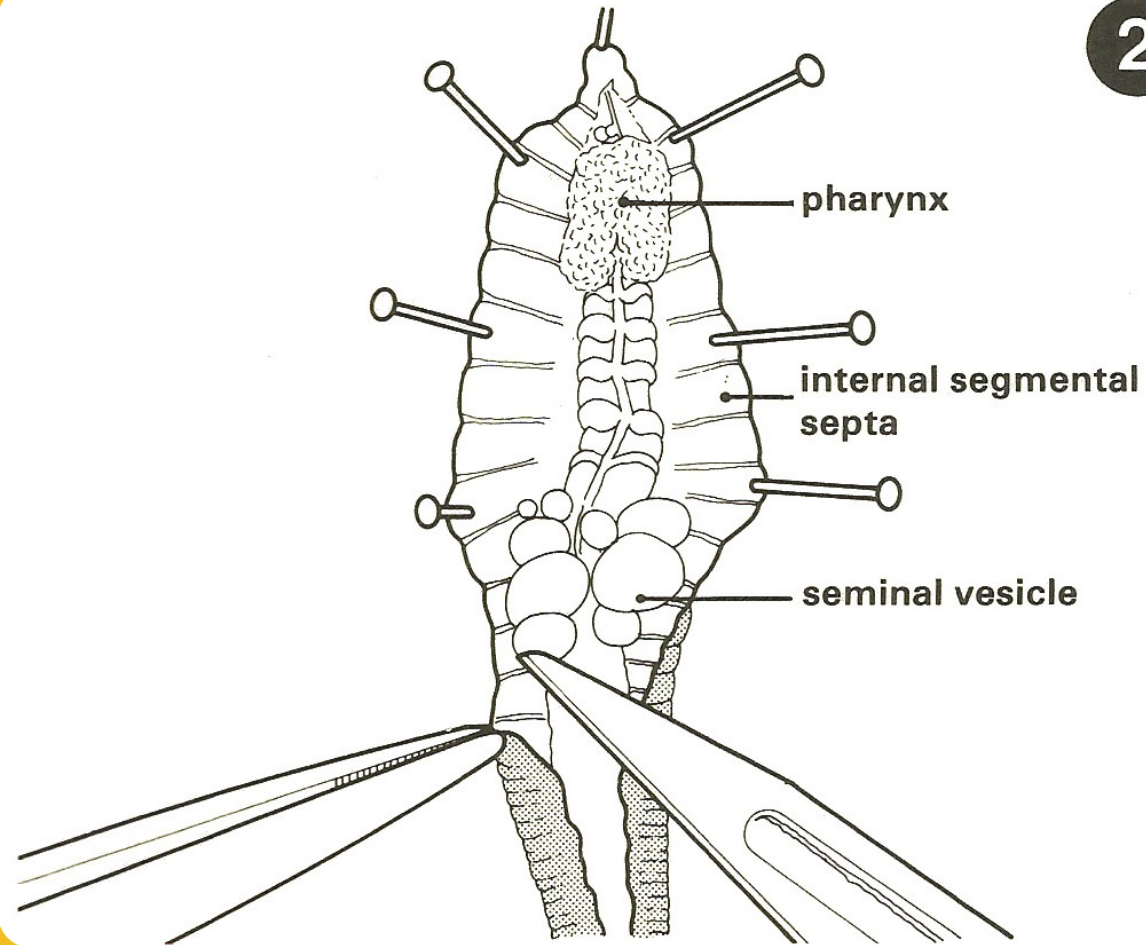


1



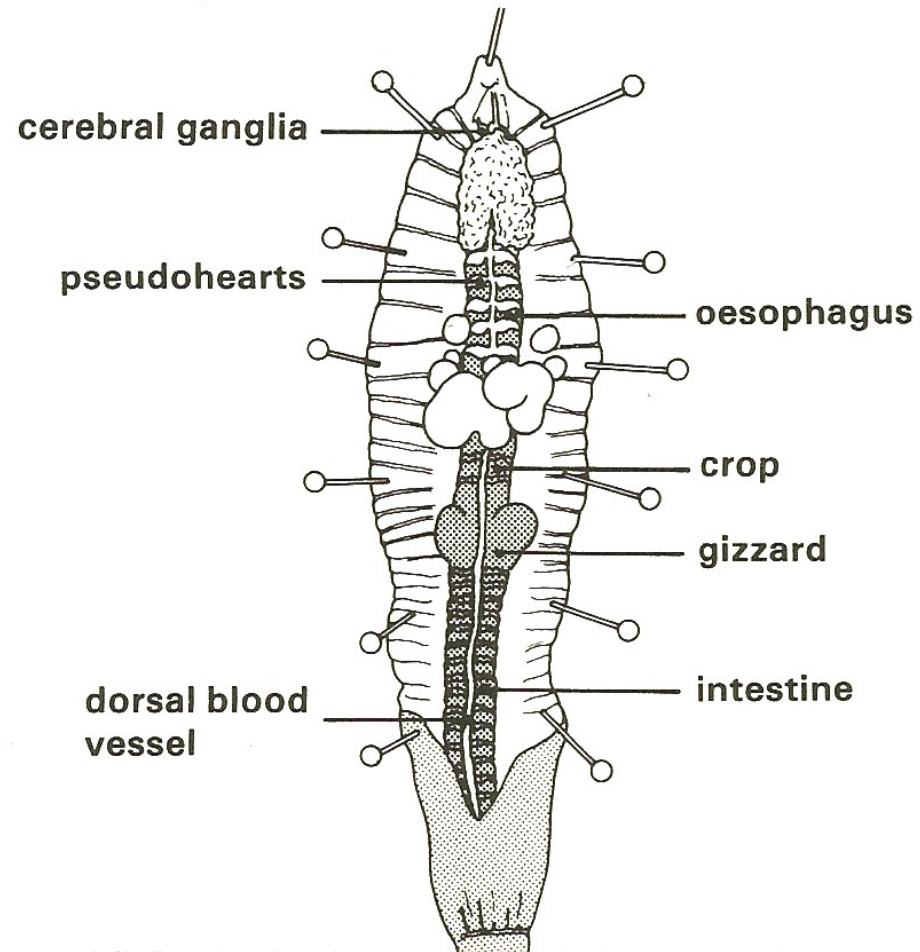
1. Identify the ventral surface of the EARTHWORM by feeling the chaetae. Make a DORSAL incision with fine scissors and cut forwards as shown, keeping the scissor points up.

2

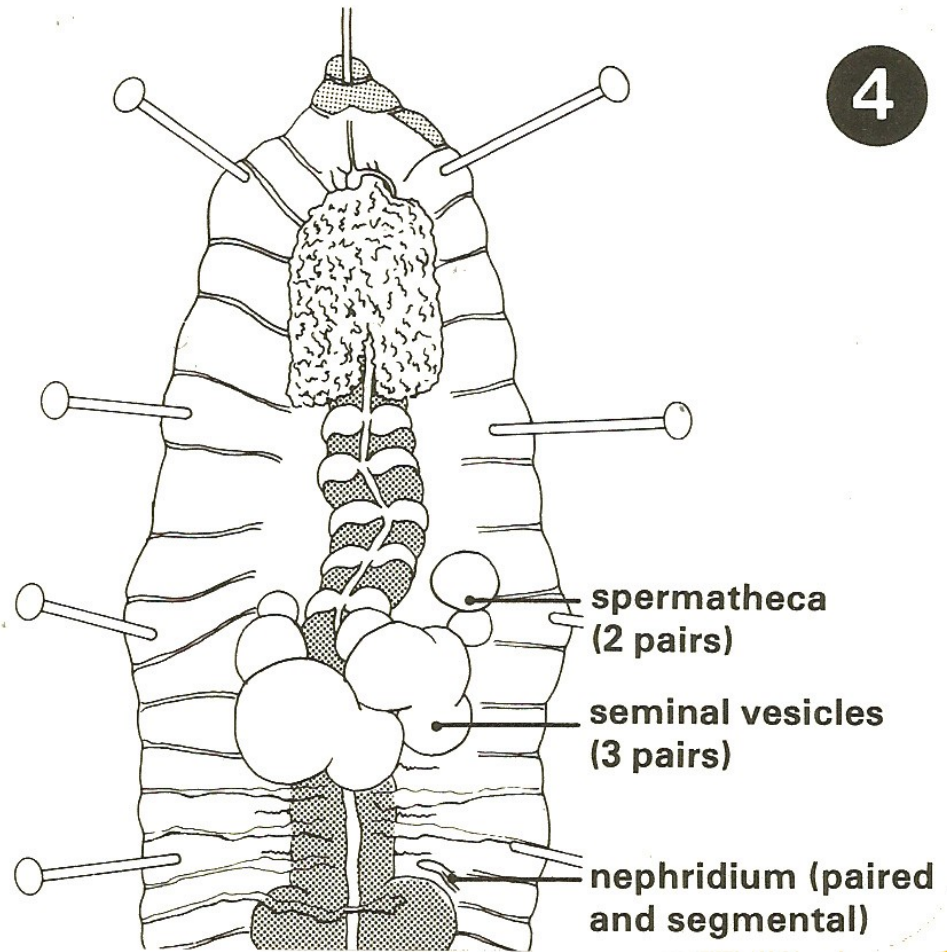


2. Pin through the first segment, stretch the worm gently and pin through towards the posterior end. Starting from the anterior end, pin the body wall out as shown, cutting the segmental septa with a fine scalpel.

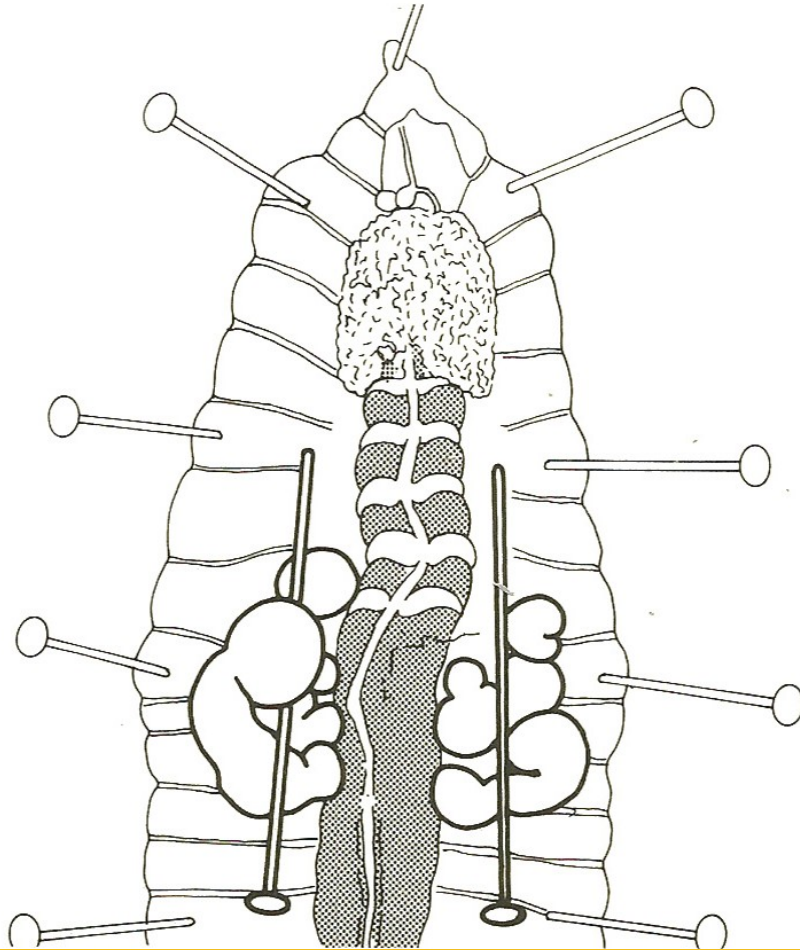
3



3. Continue the dorsal cut, and the pinning, posteriorly. Cover the dissection with water.



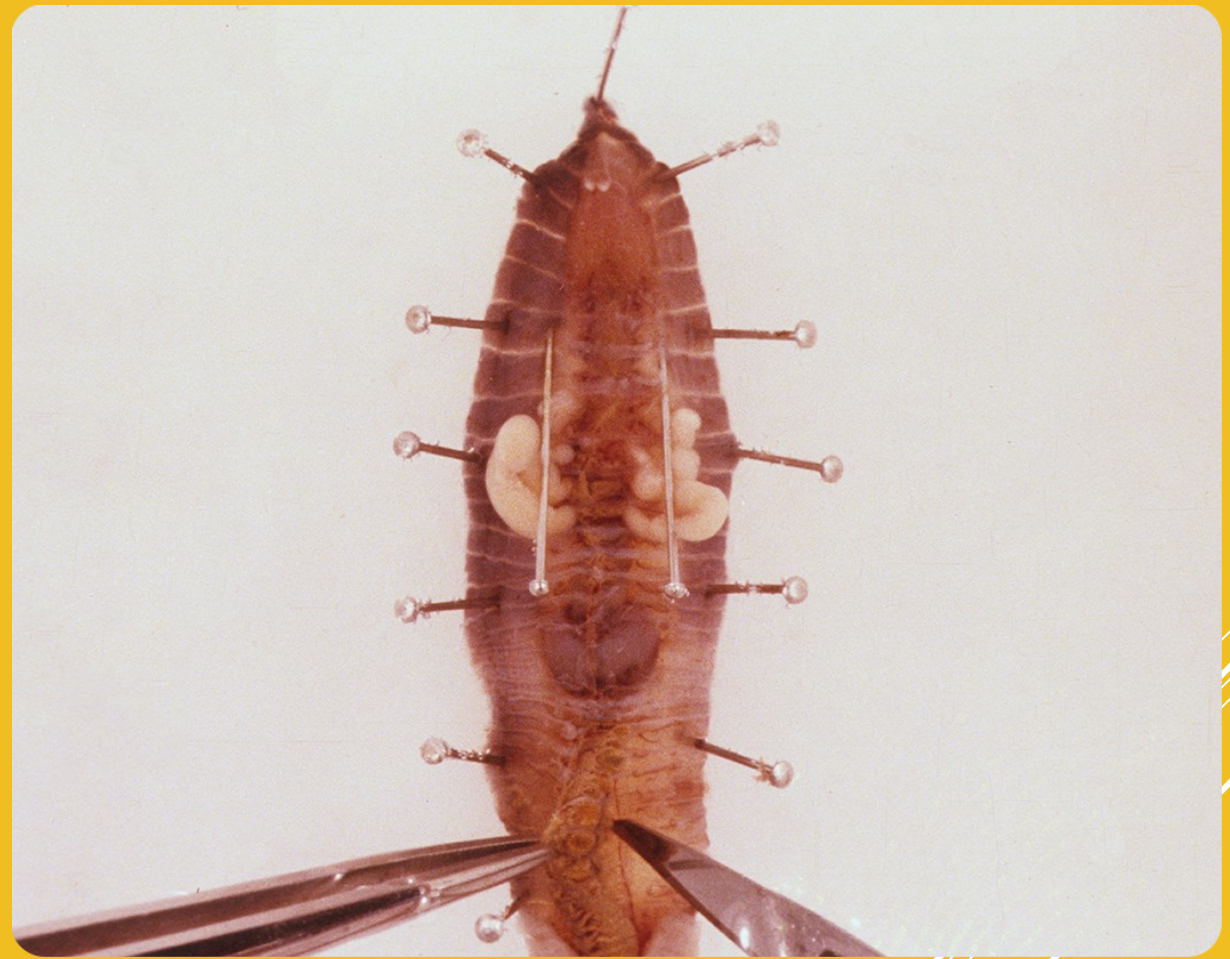
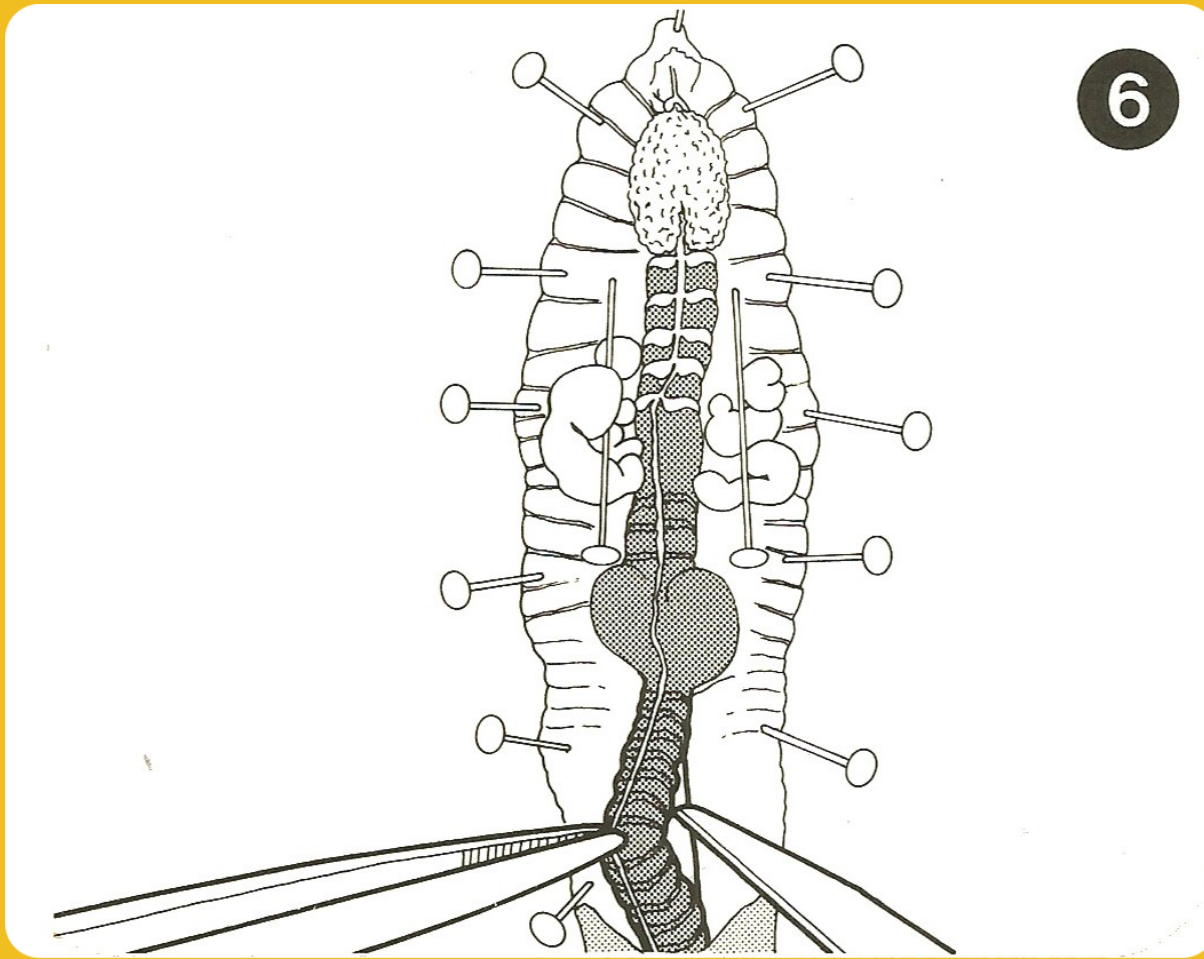
4. Anterior structures in situ.



5

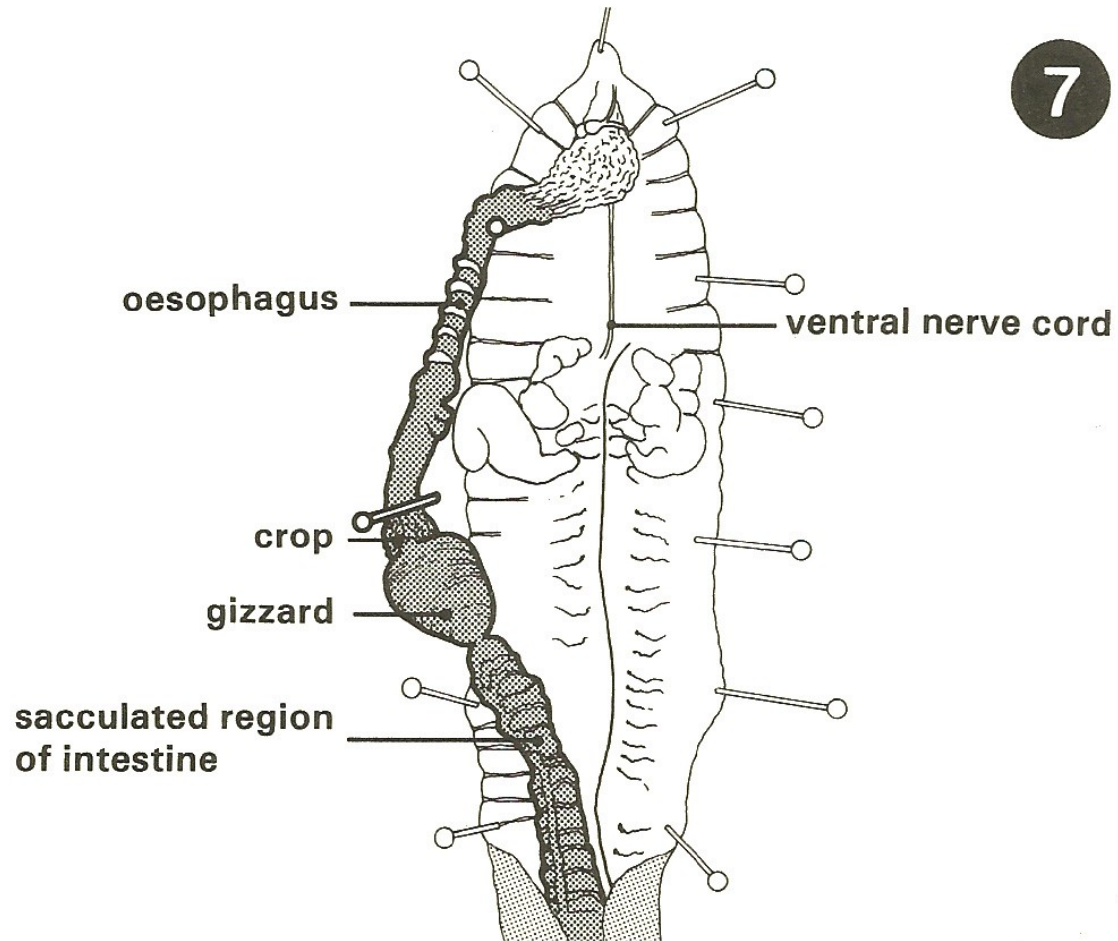


5. Hold the seminal vesicles away from the gut with pins pushed 'horizontally, into the wax.

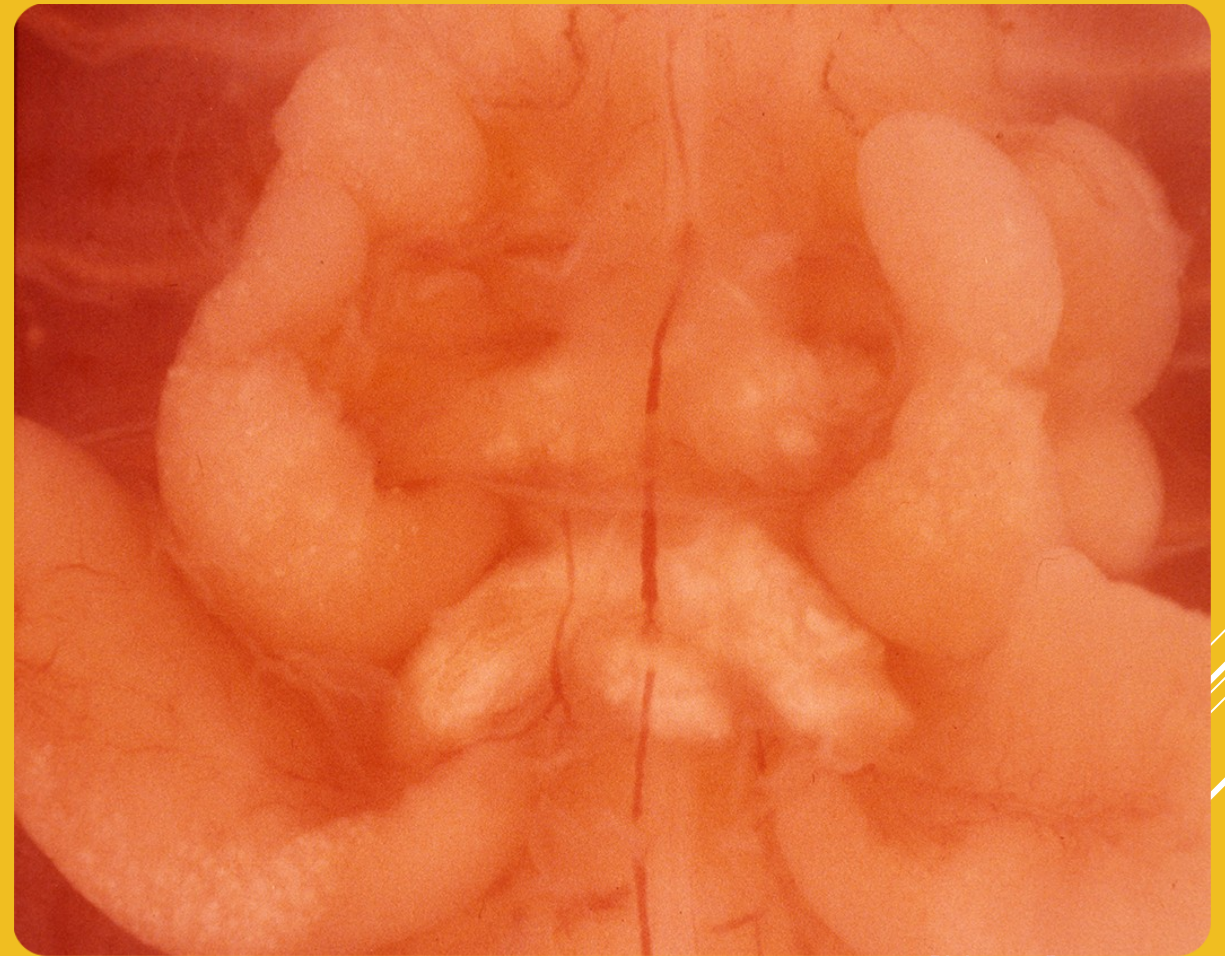
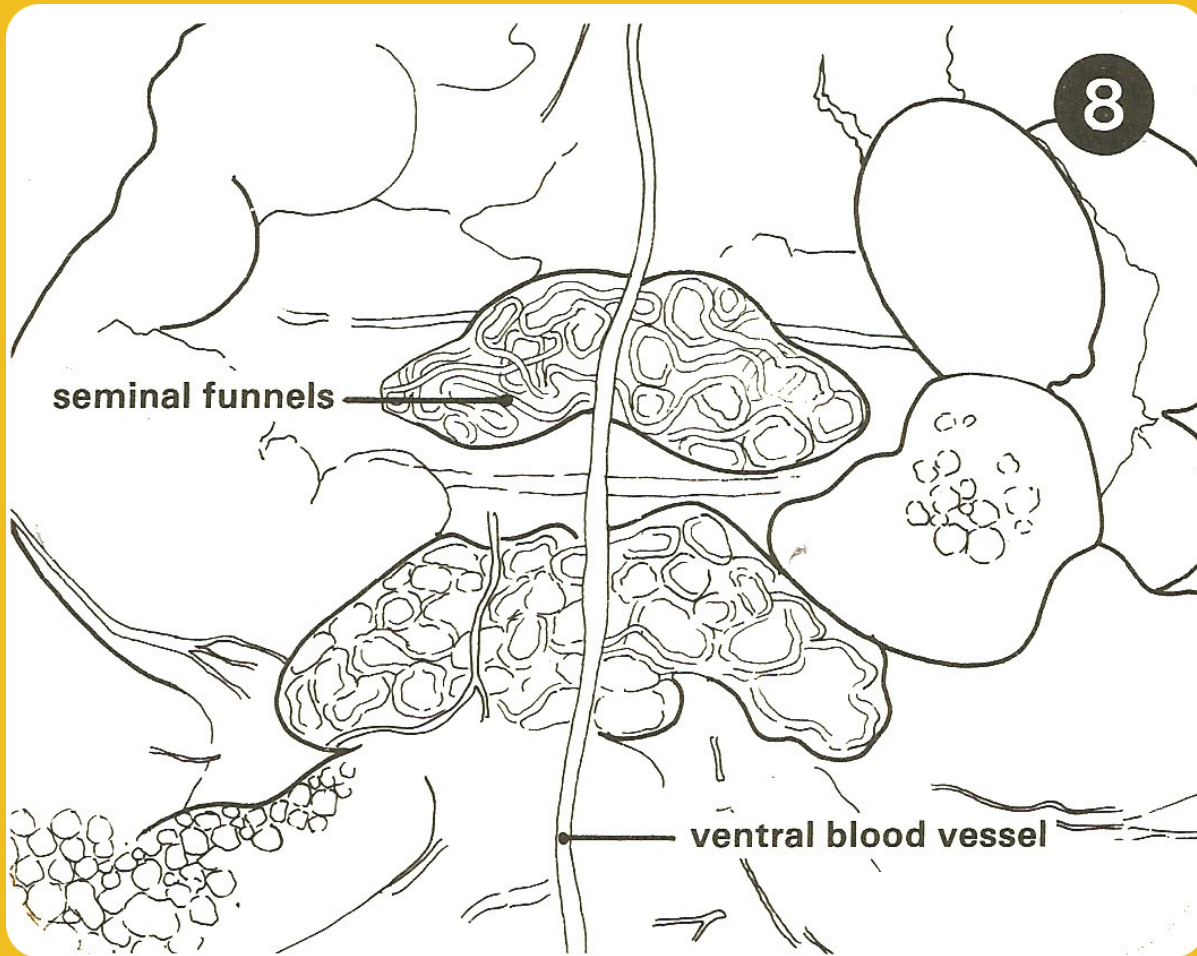


6. Lift the gut posterior to the crop and with a fine scalpel gently free it from all underlying structures.

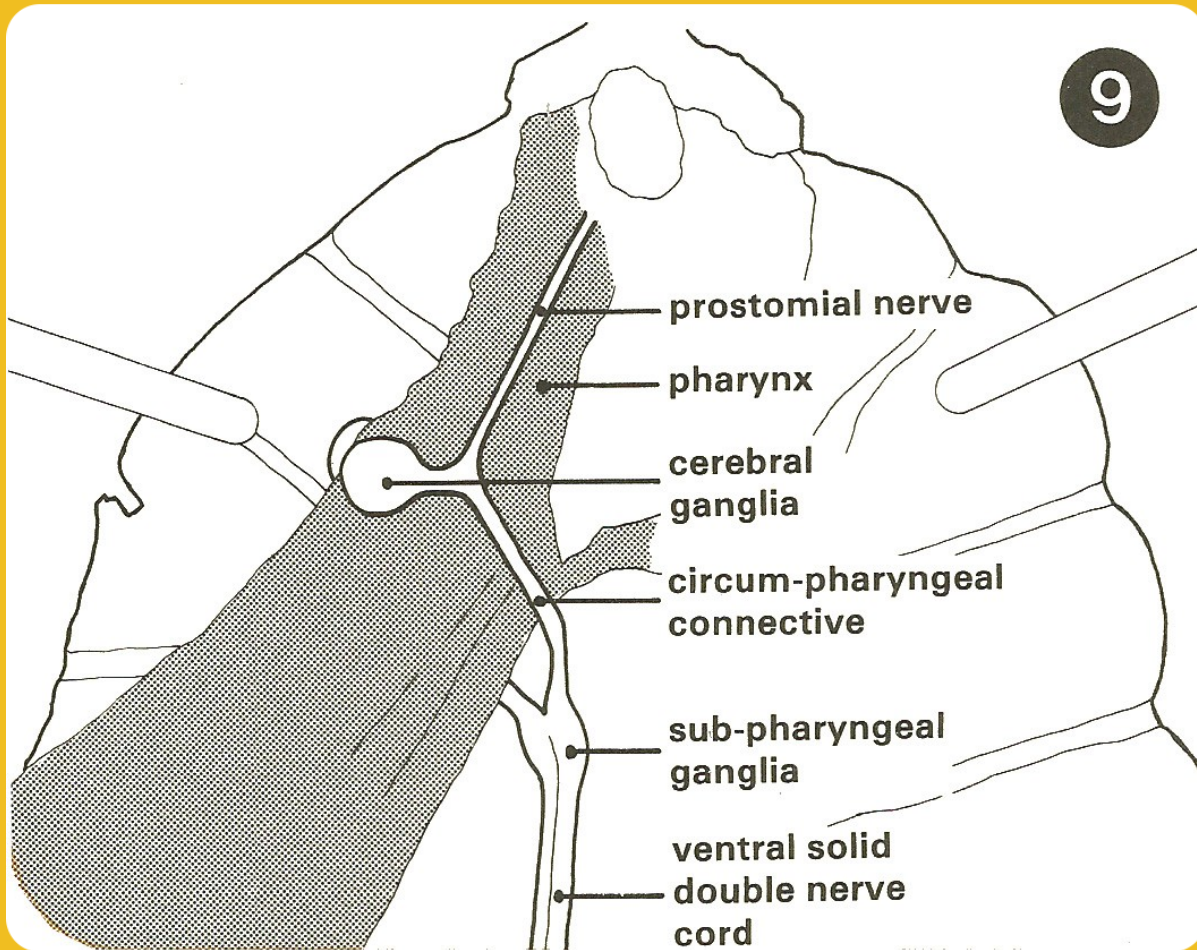
7



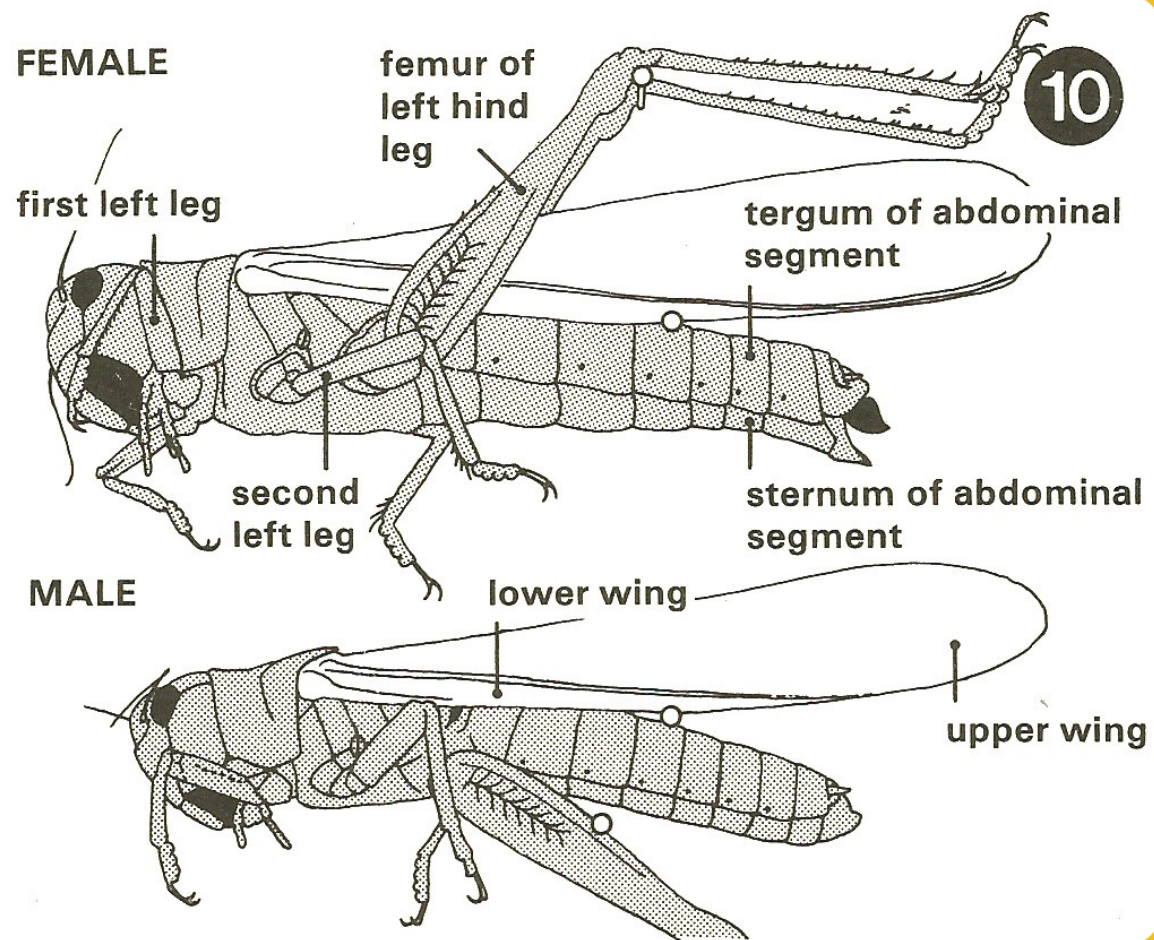
7. Displace the gut to one side to reveal the reproductive organ's and the ventral nerve cord. Remove the horizontal pins holding the seminal vesicles and identify as many structures as possible using a lens.



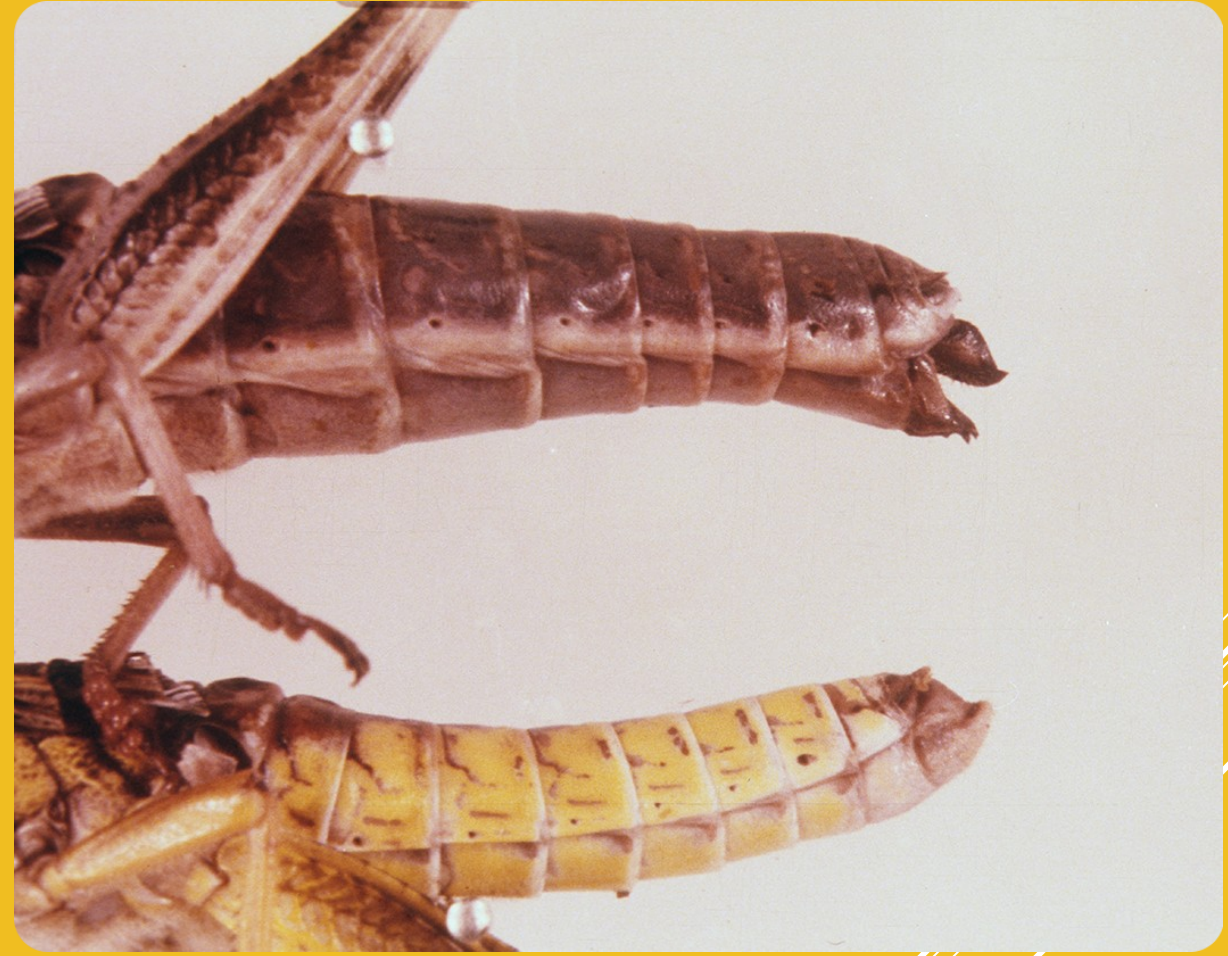
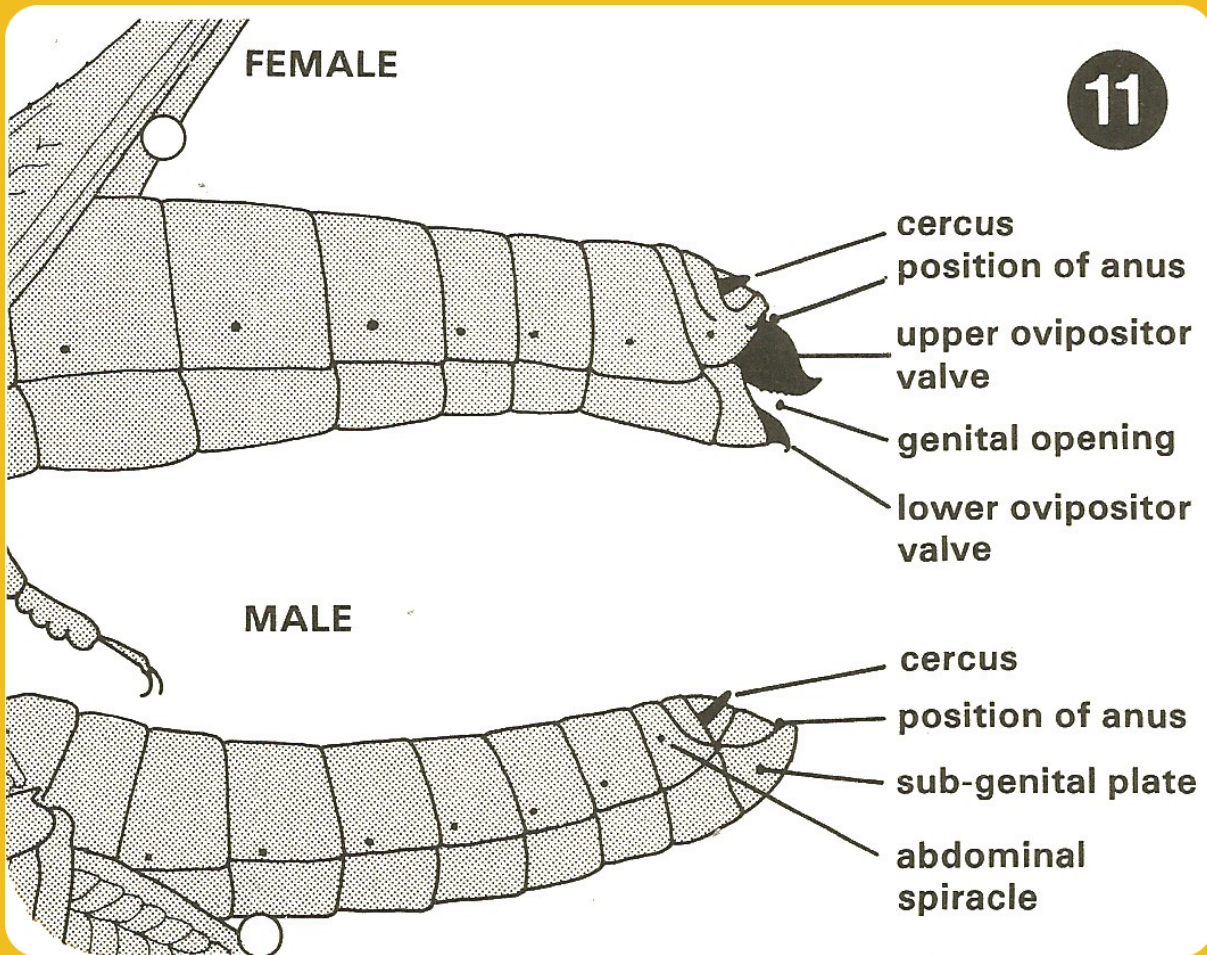
8. Seminal funnels.



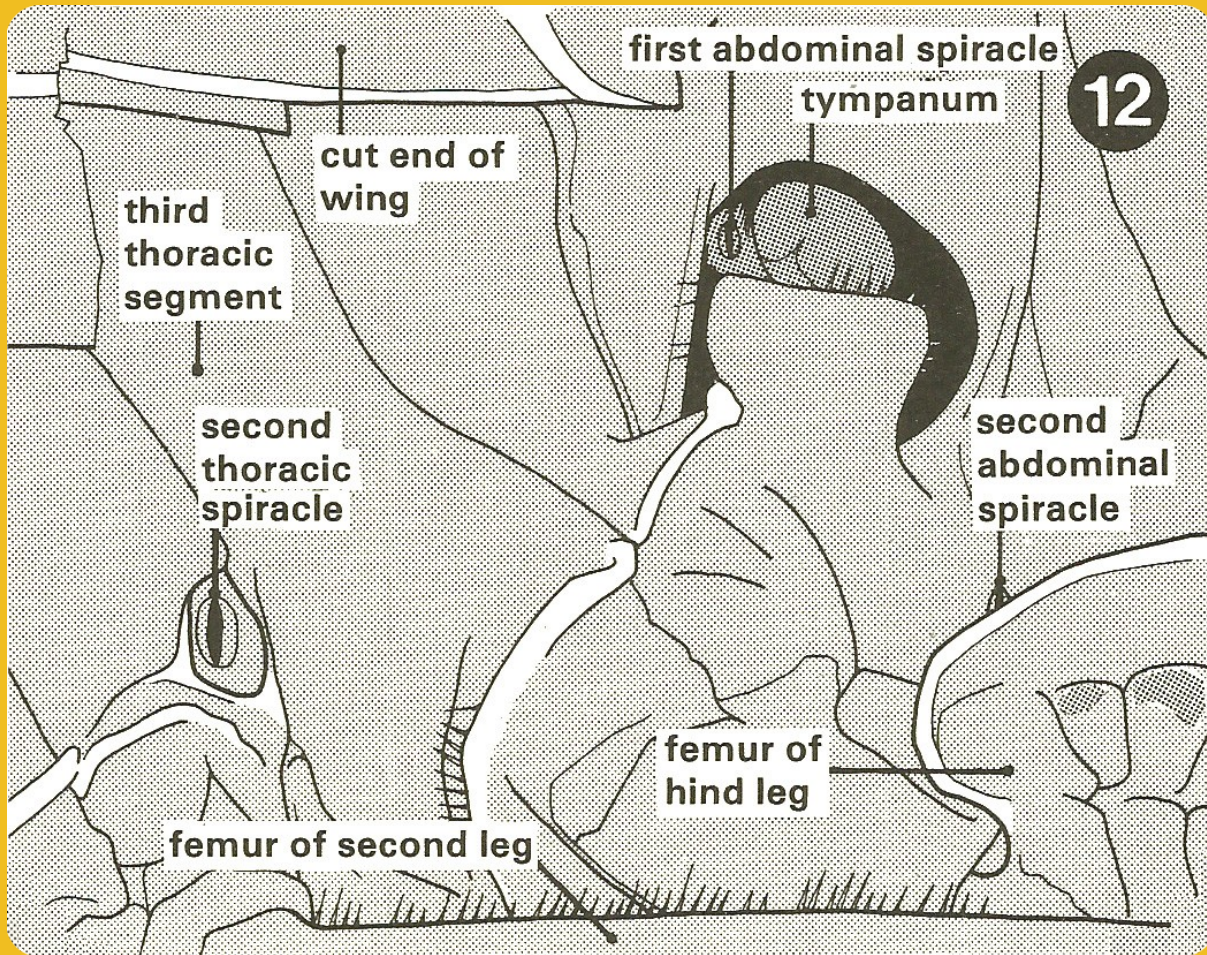
9. Cerebral ganglia at higher magnification.



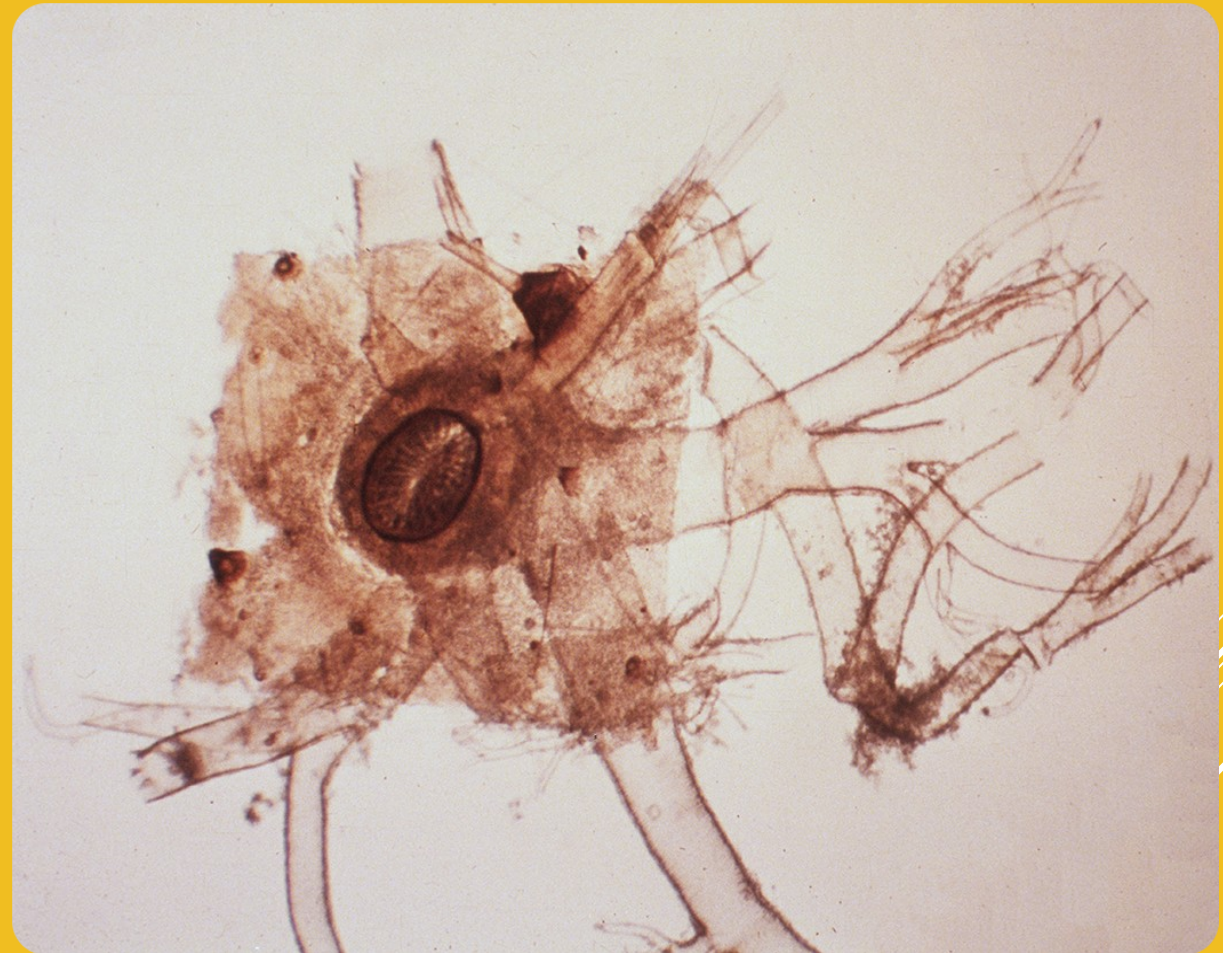
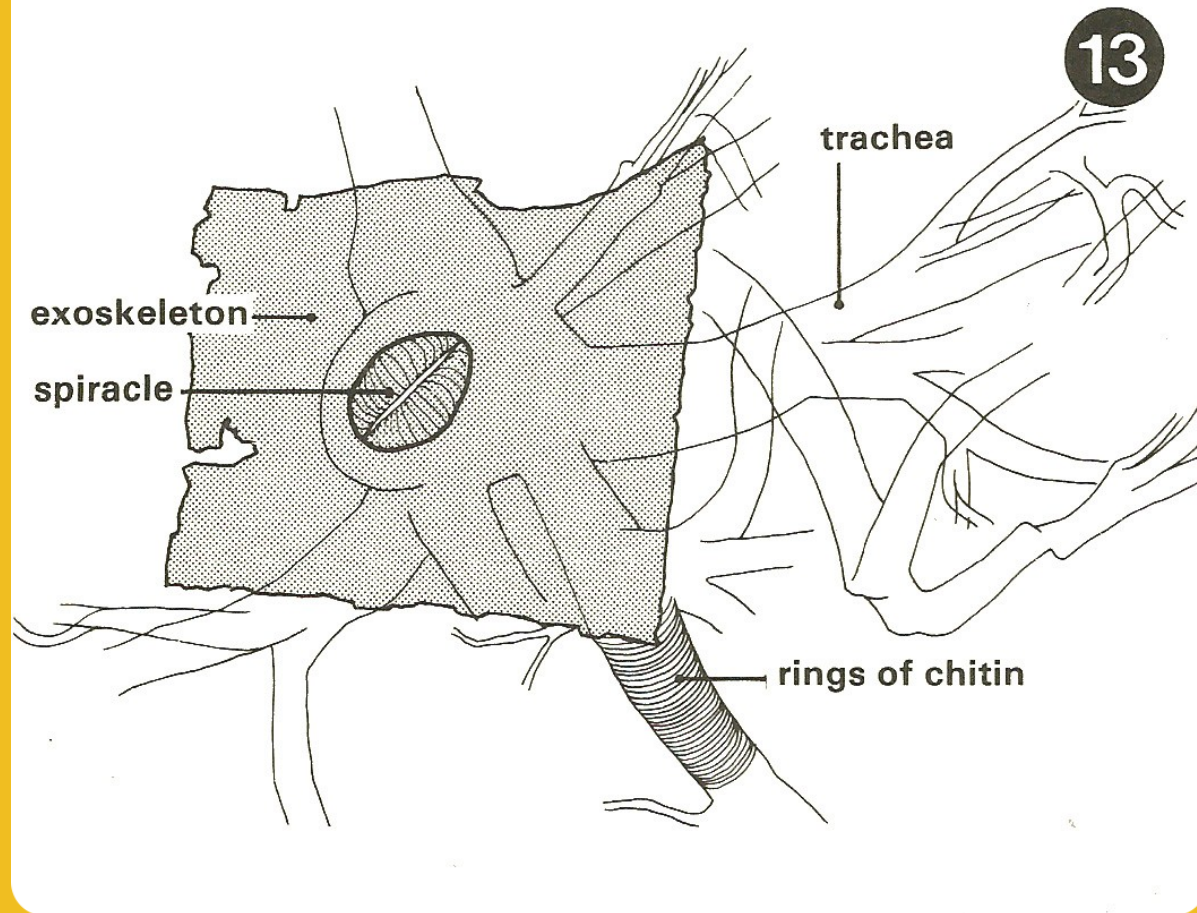
10. External features of male and female LOCUST (female above).



11. Male and female (above) abdomens compared. Note the black ovipositor valves in the female.

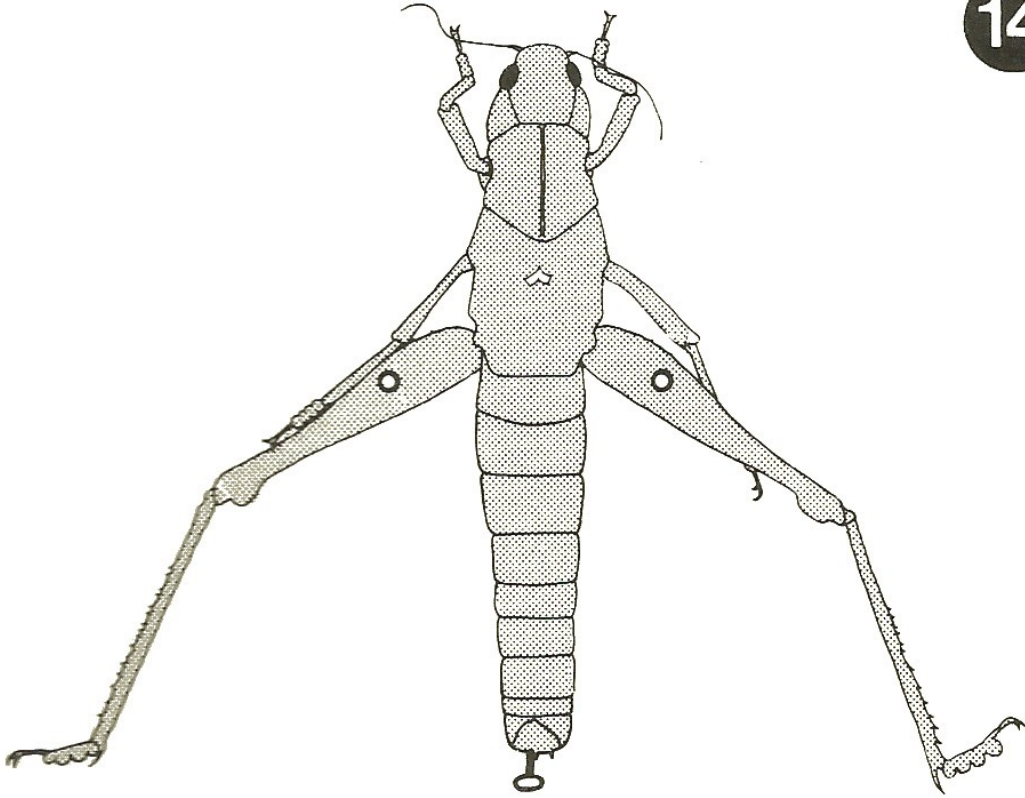


12. Second thoracic spiracle and tympanum at greater magnification.



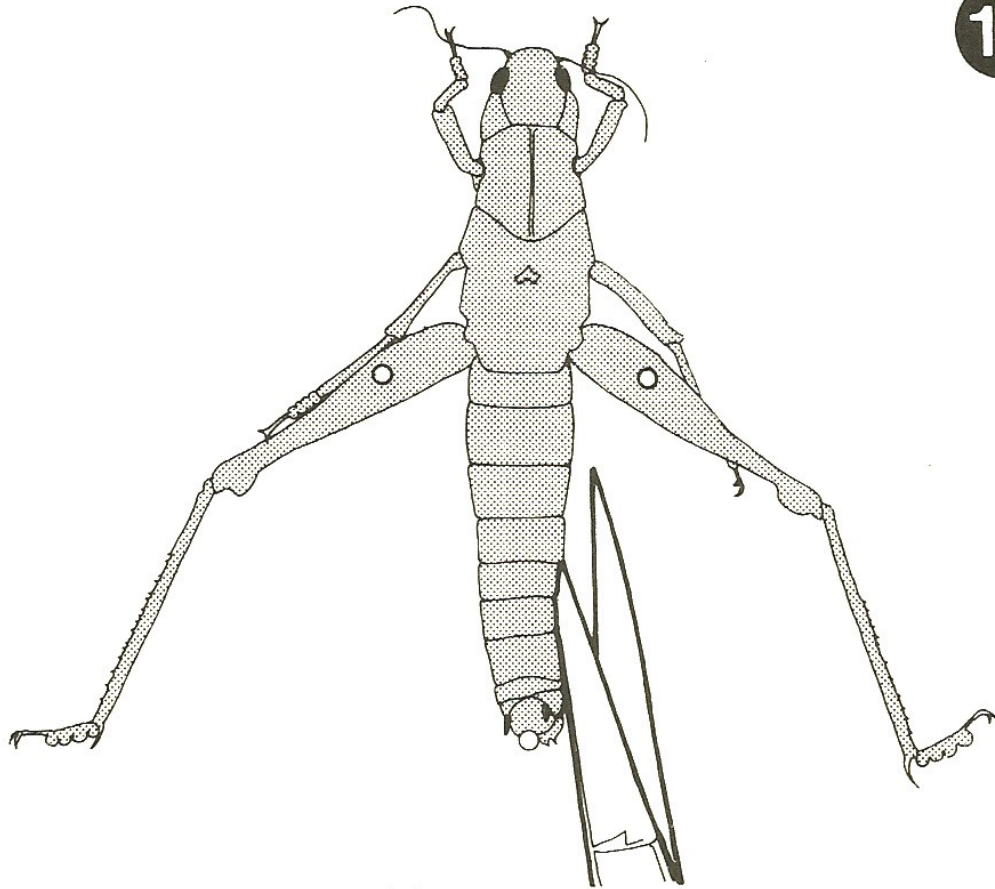
13. Microscope preparation of spiracle and attached tracheae.

14

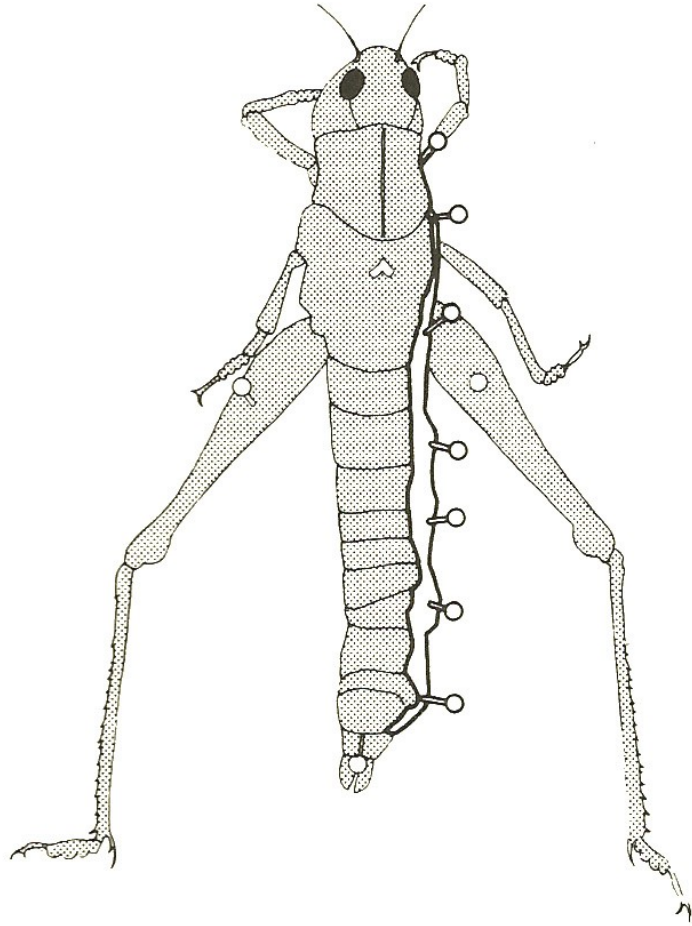


14. Fix to wax by pins through the flat surface of the hind legs.

15



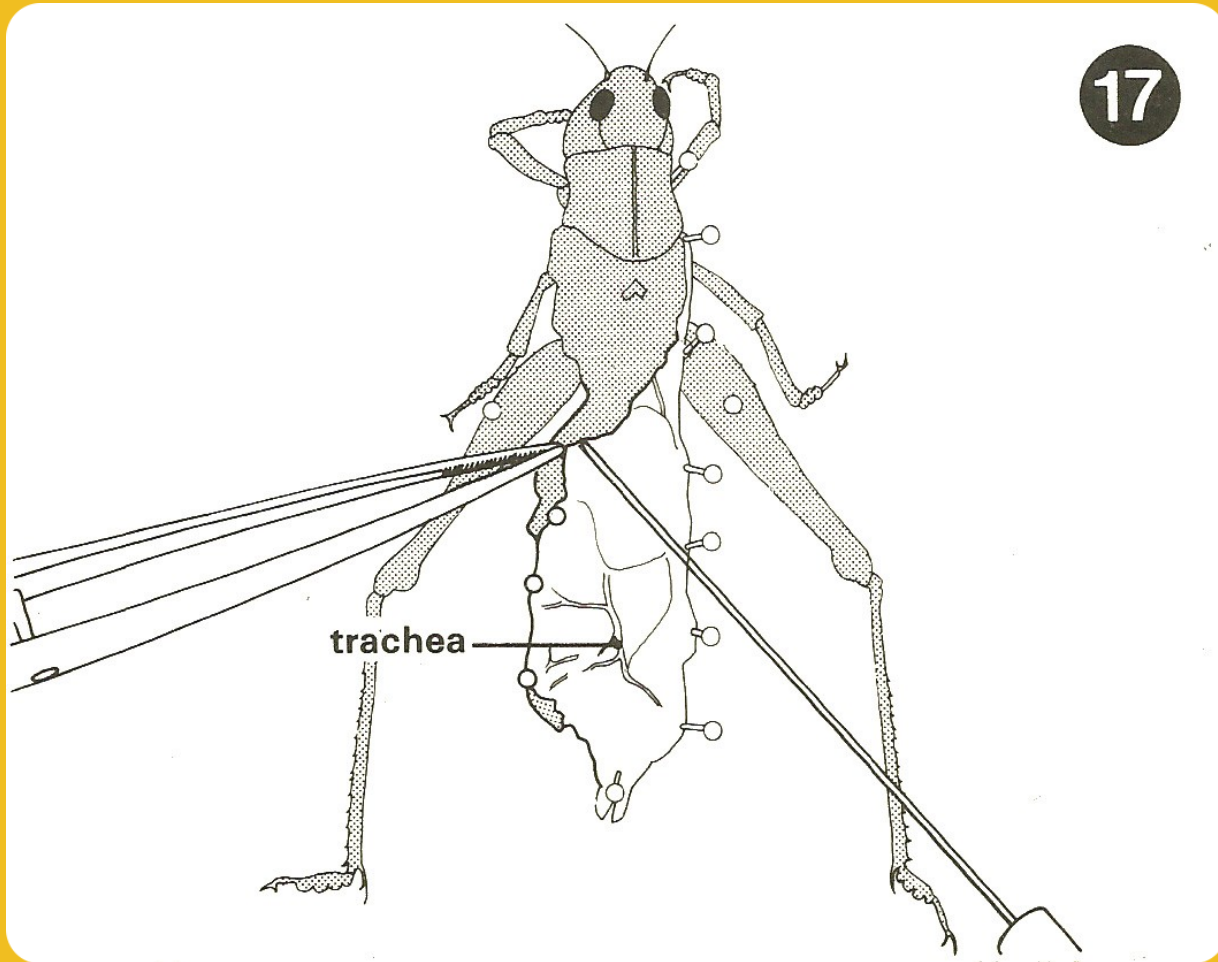
15. Insert the point of a pair of small scissors into the abdominal cavity on one side. Extend the incision to the head and the last abdominal segment.



16

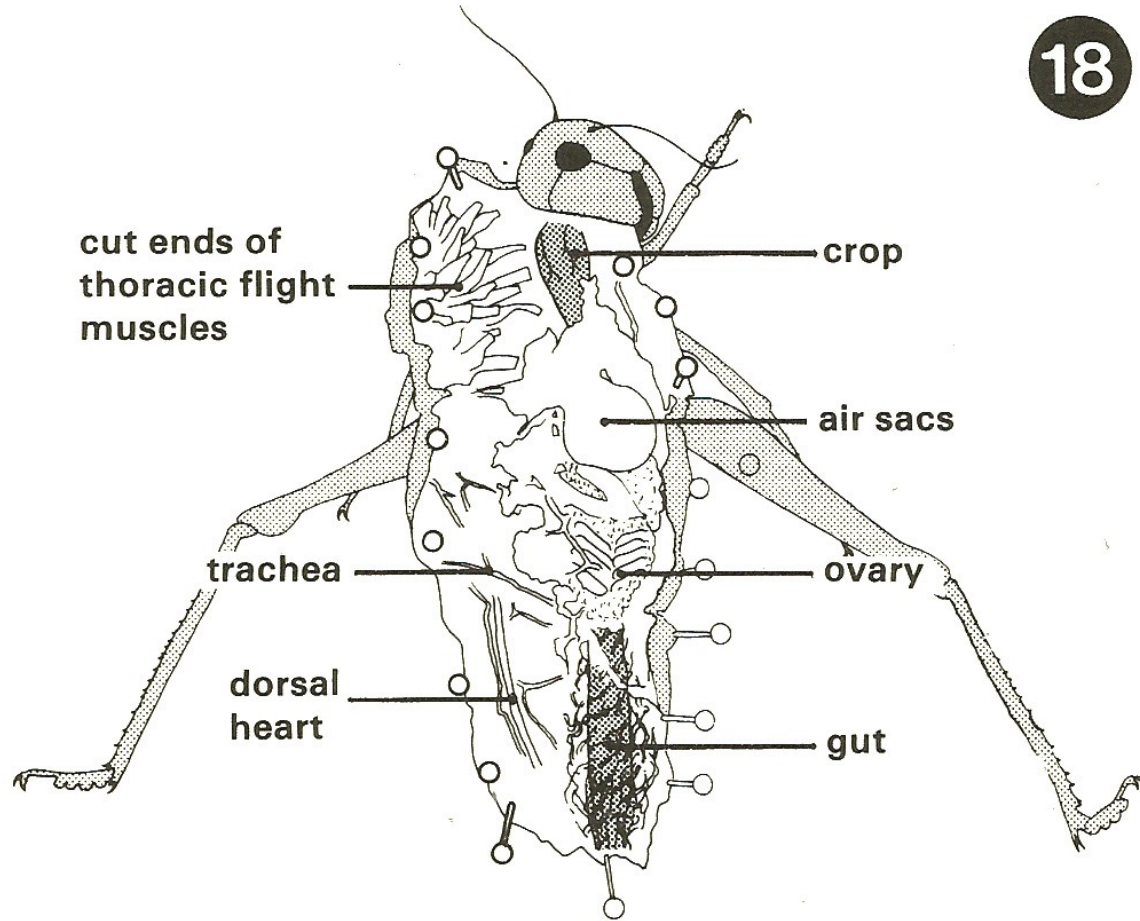


16. Pin the lower cut edge of the body wall, laying the pins away from the insect.



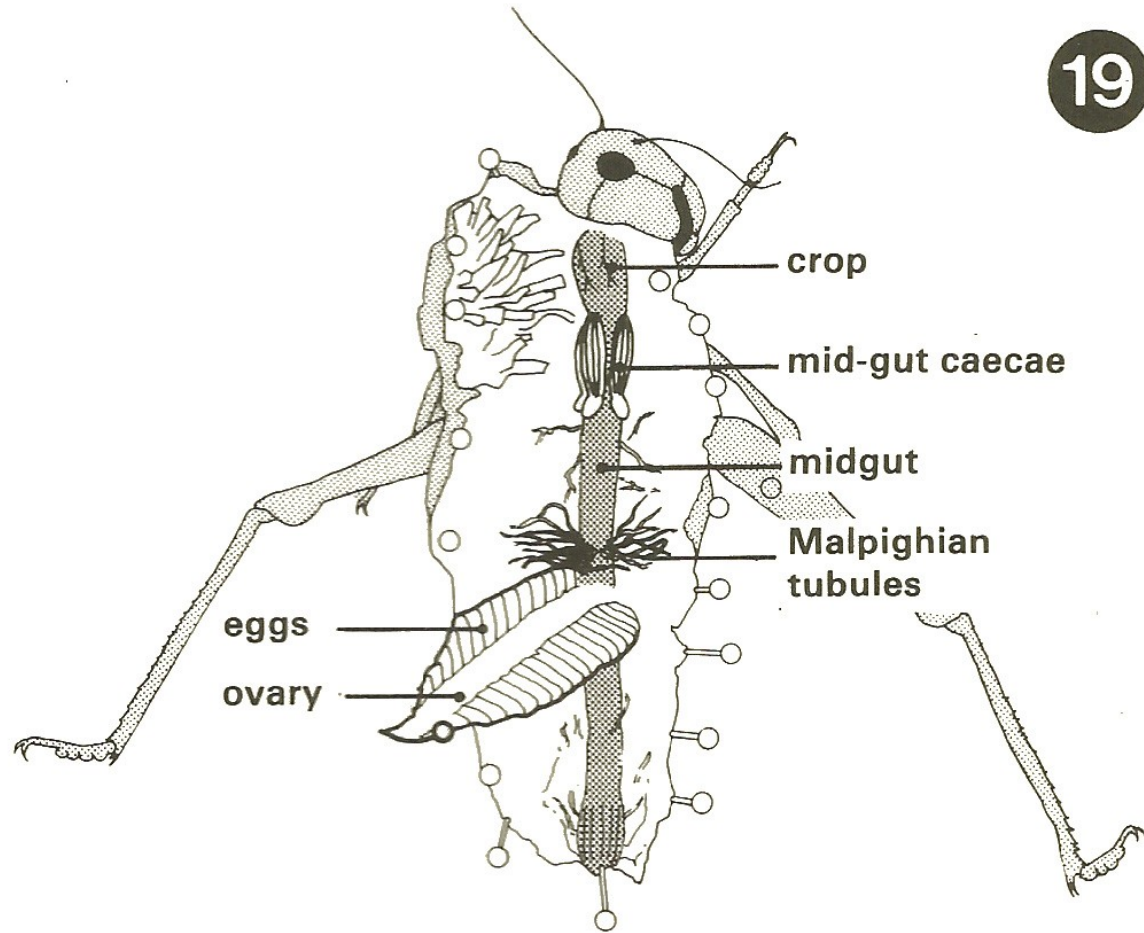
17. Lift the dorsal exoskeleton with tweezers, gently freeing it from strands of tissue, and pin down. Take care in the thorax where the exoskeleton is thick and attached to the powerful flight muscles.

18

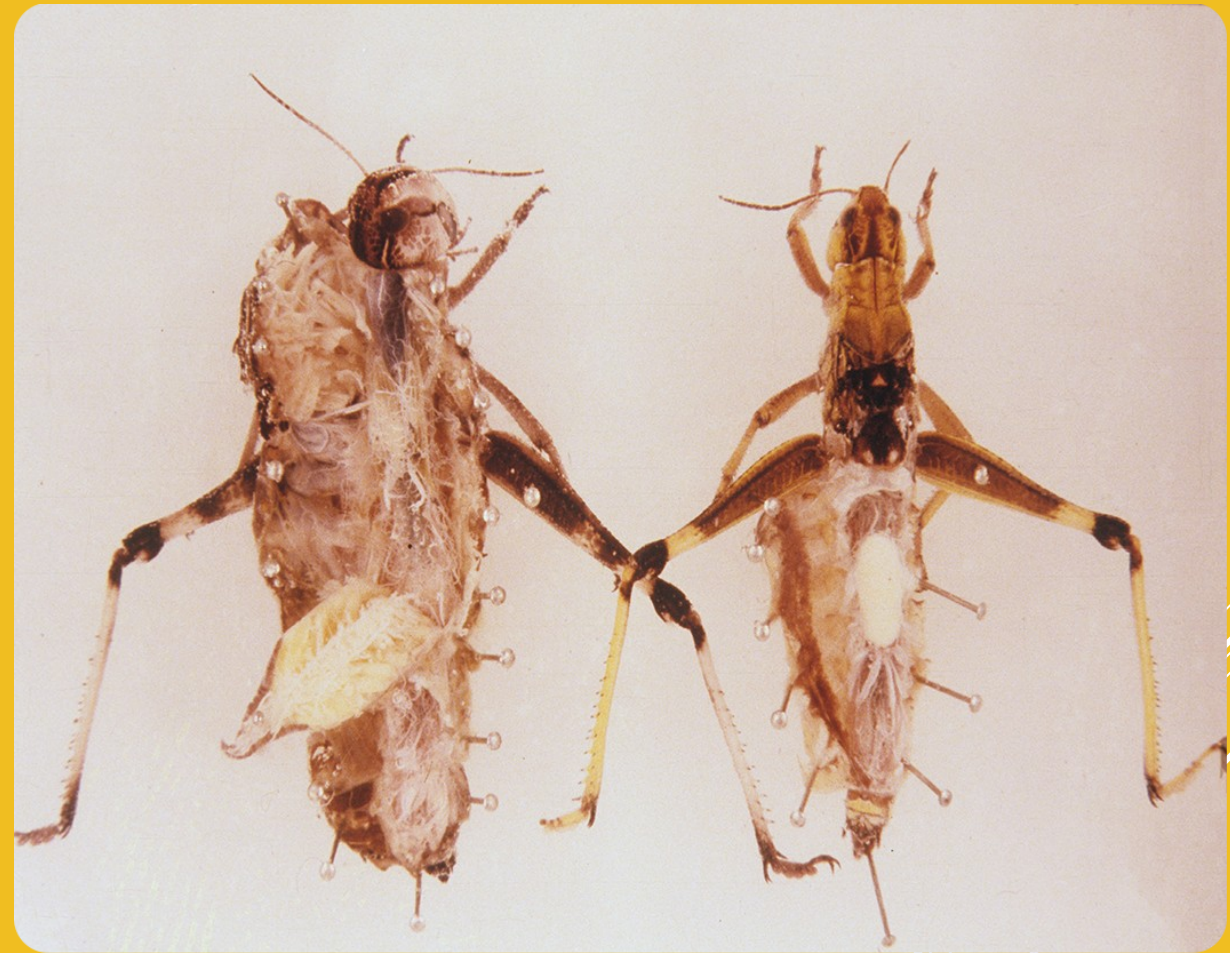
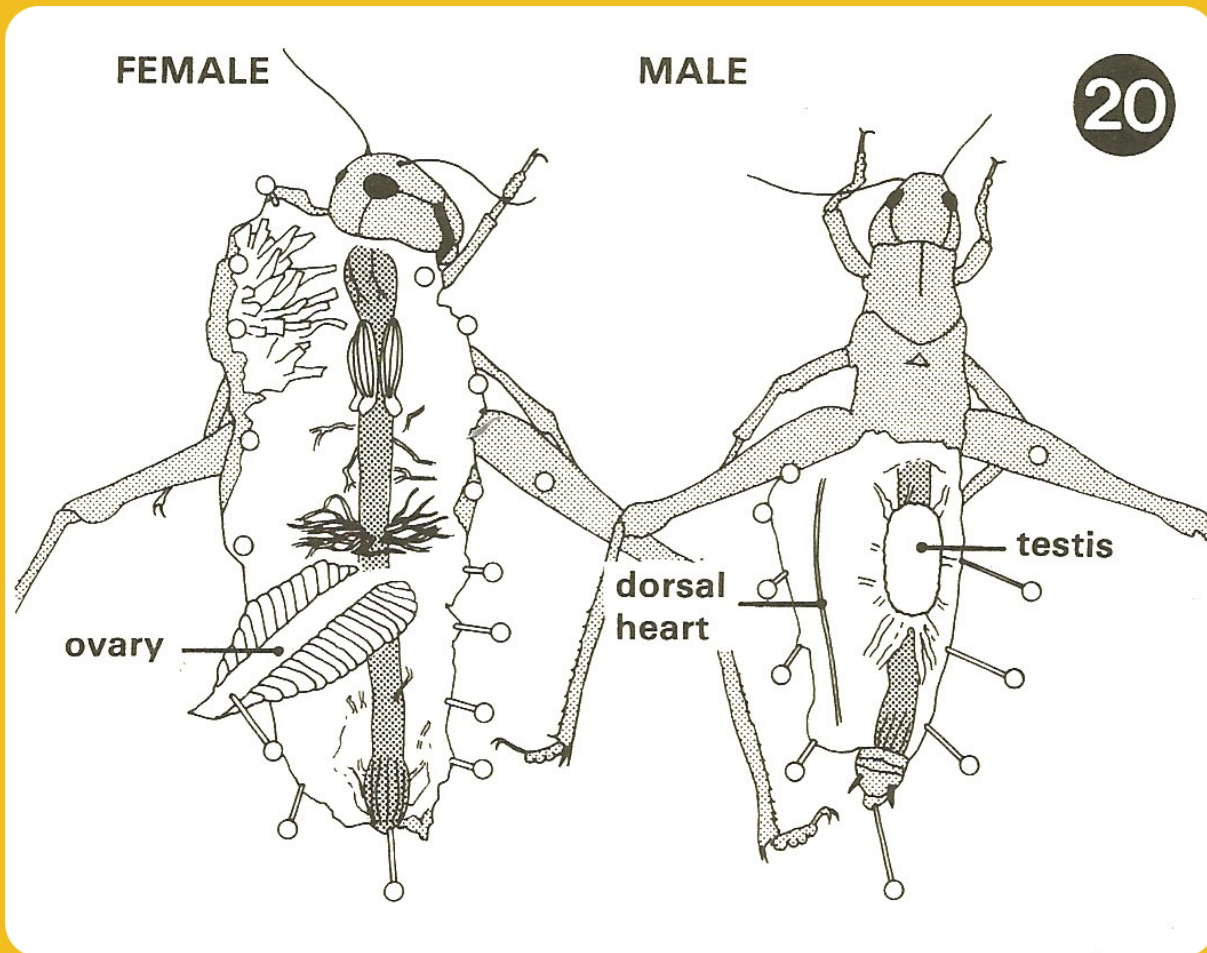


18. Complete the pinning and cover with water. Note the glistening air-filled tracheae and air sacs; and the dorsal tubular heart on the underside of the dorsal exoskeleton.

19

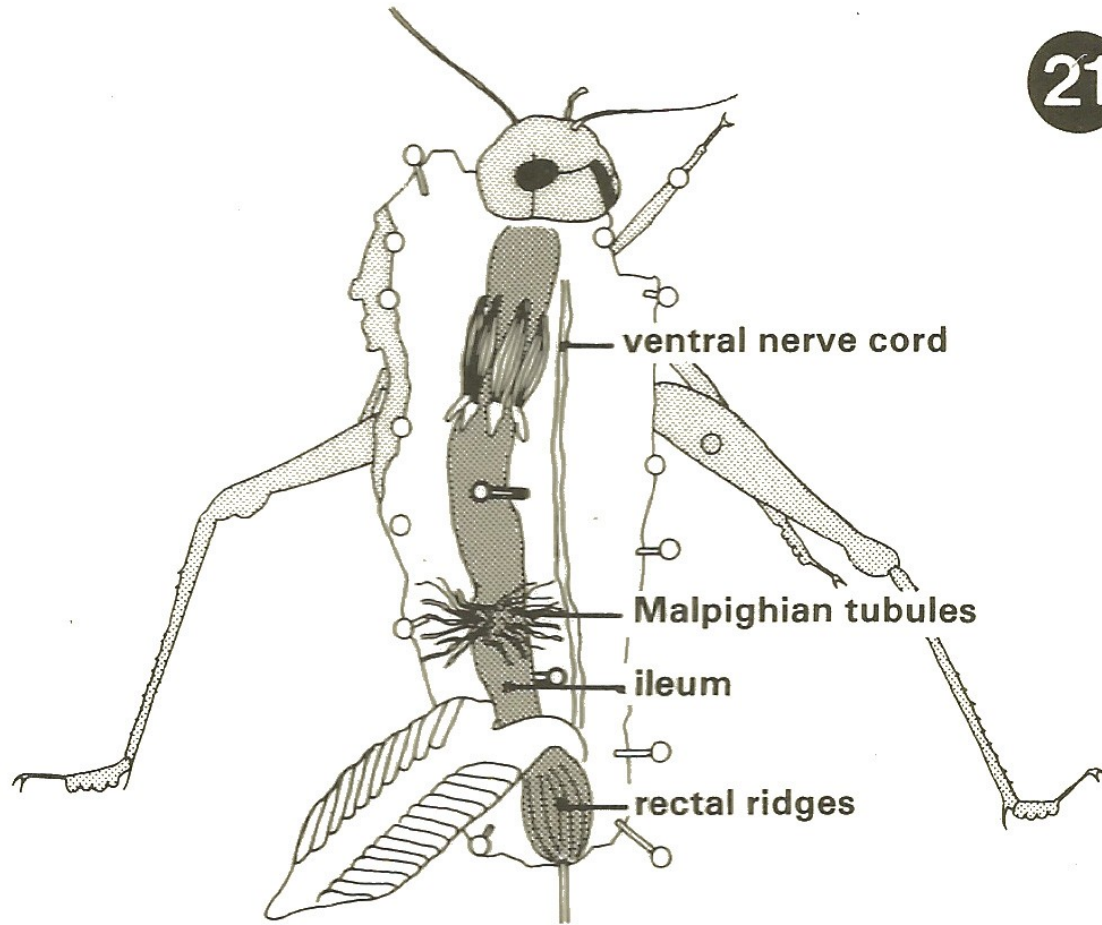


19. Cut through the ligaments on the front ends of the gonads and pin the gonads back to one side. Clear the gut of tracheae and fat bodies.

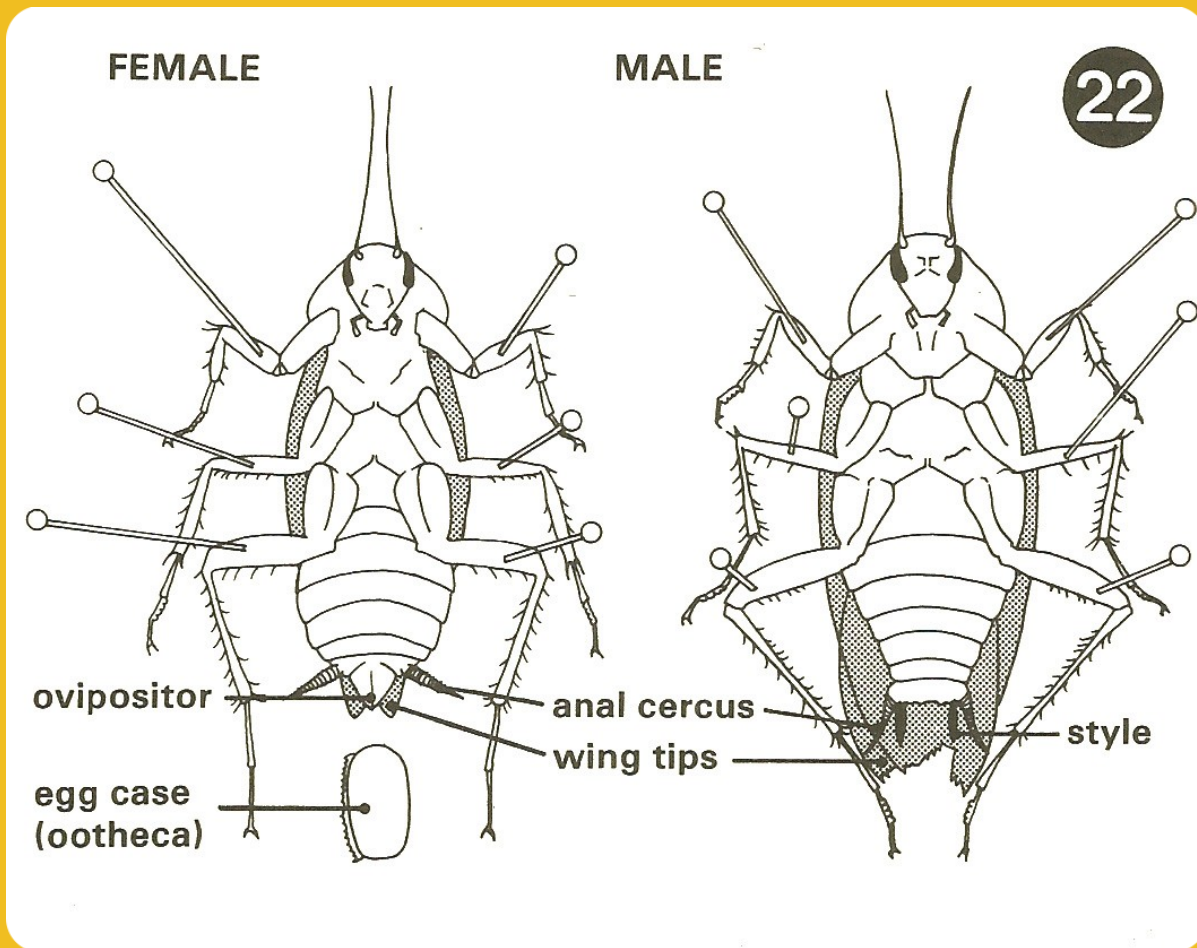


20. Abdominal dissection of male for comparison. The testes appear as a single cream coloured mass.

21

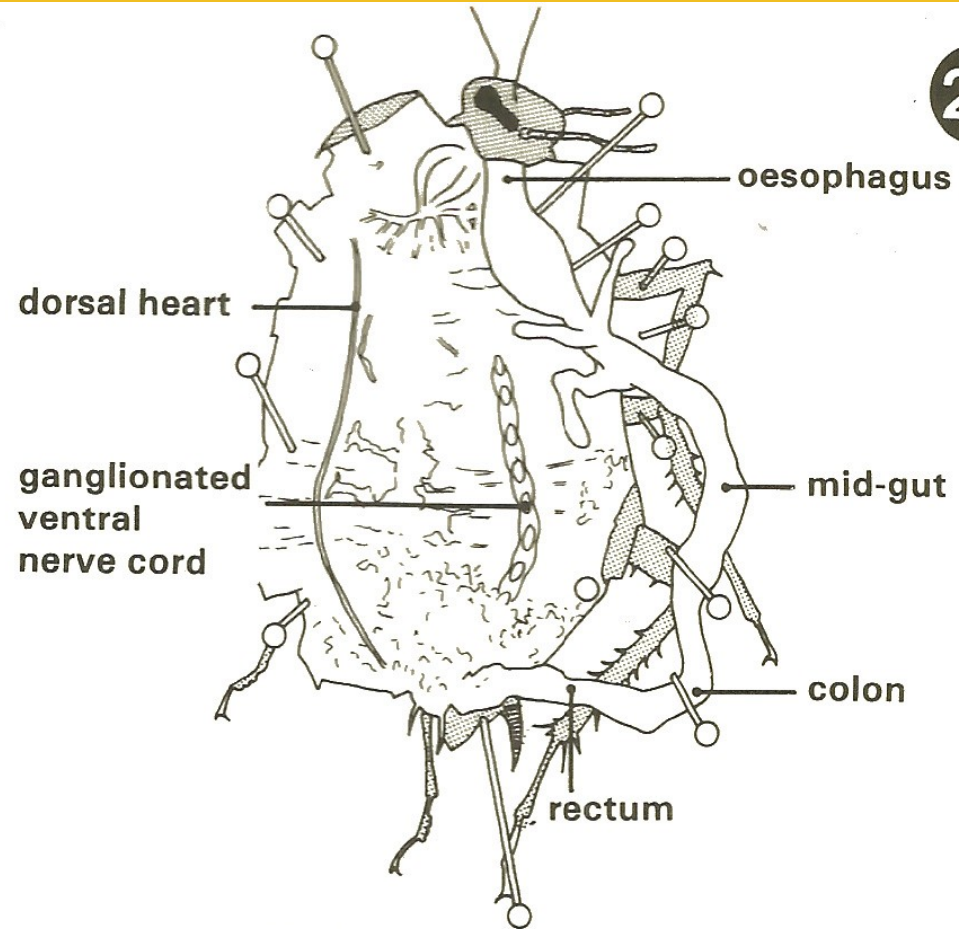


21. Displace the gut to one side to display the ventral nerve cord.

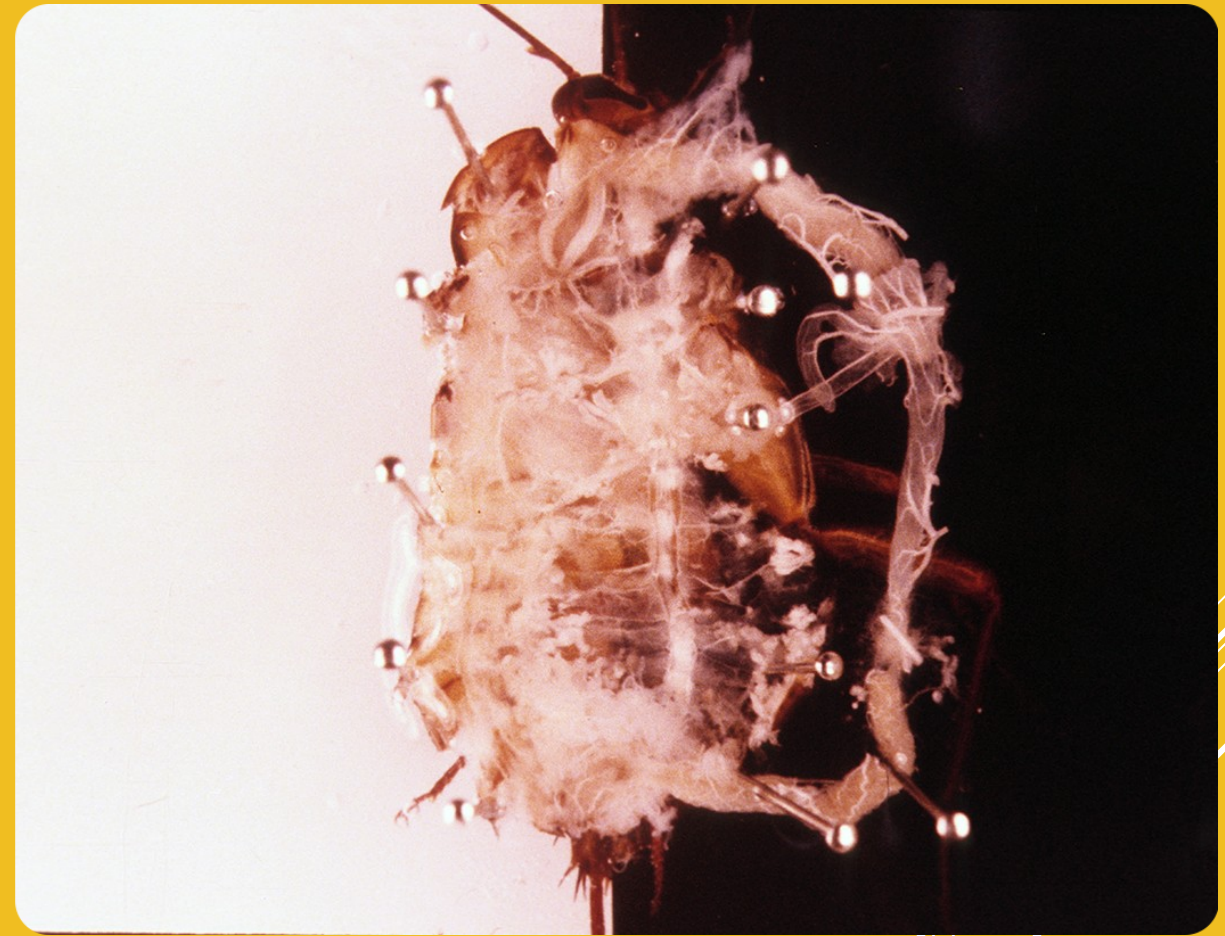
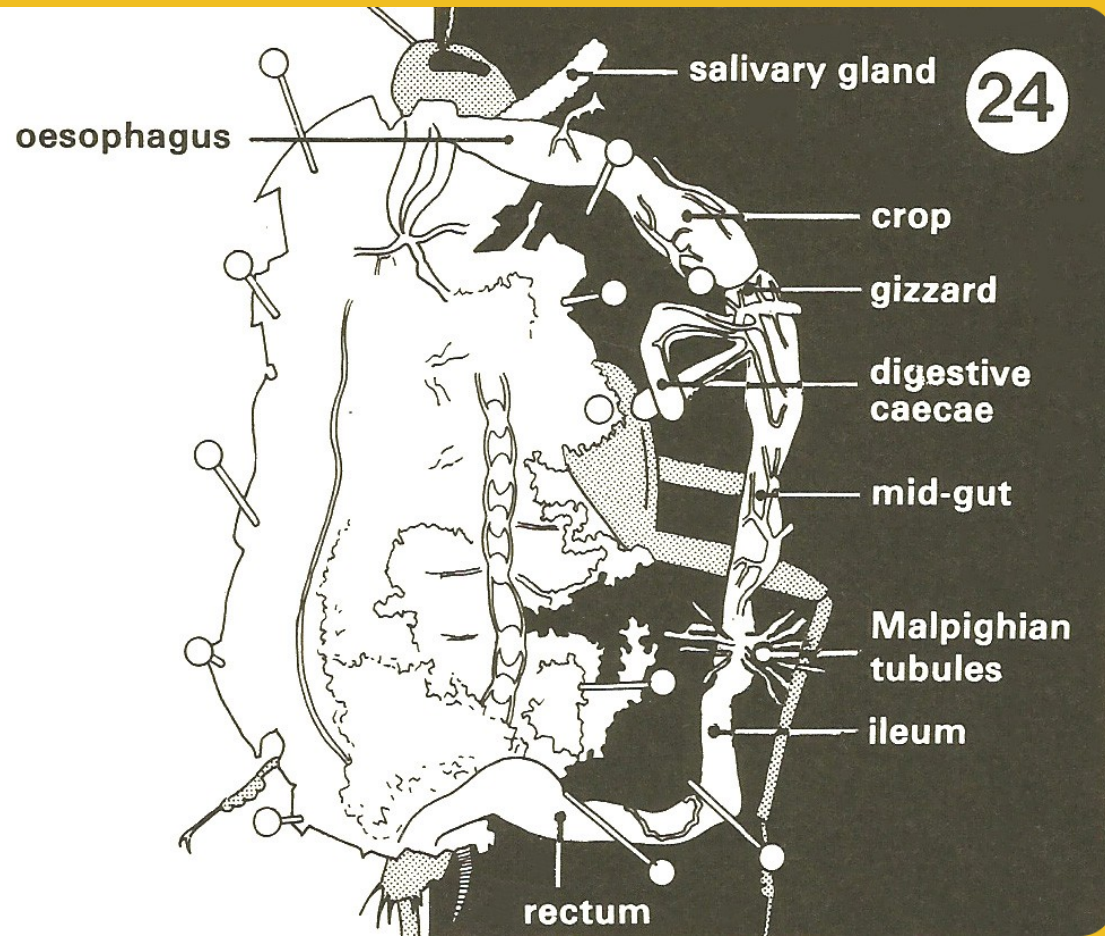


22. Ventral view of female (left with egg pod) and male COCKROACH. Note the difference in wing length, and styles on last abdominal segment in male.

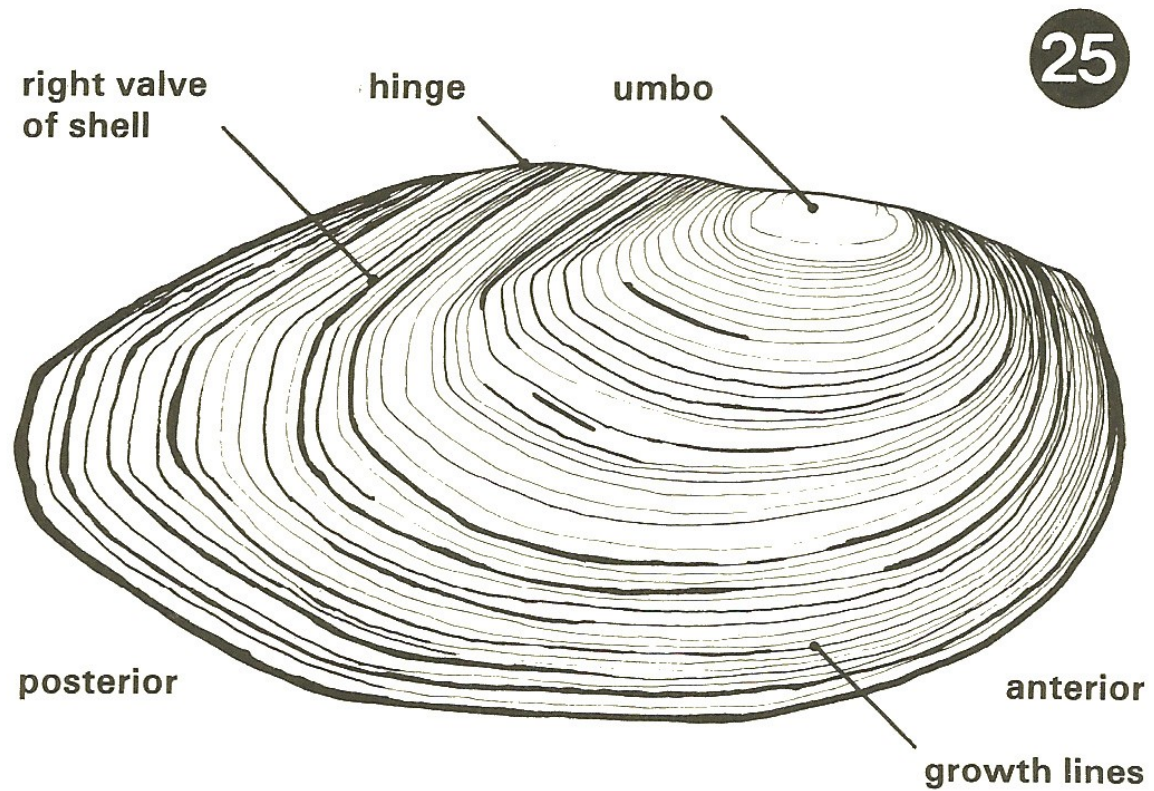
23



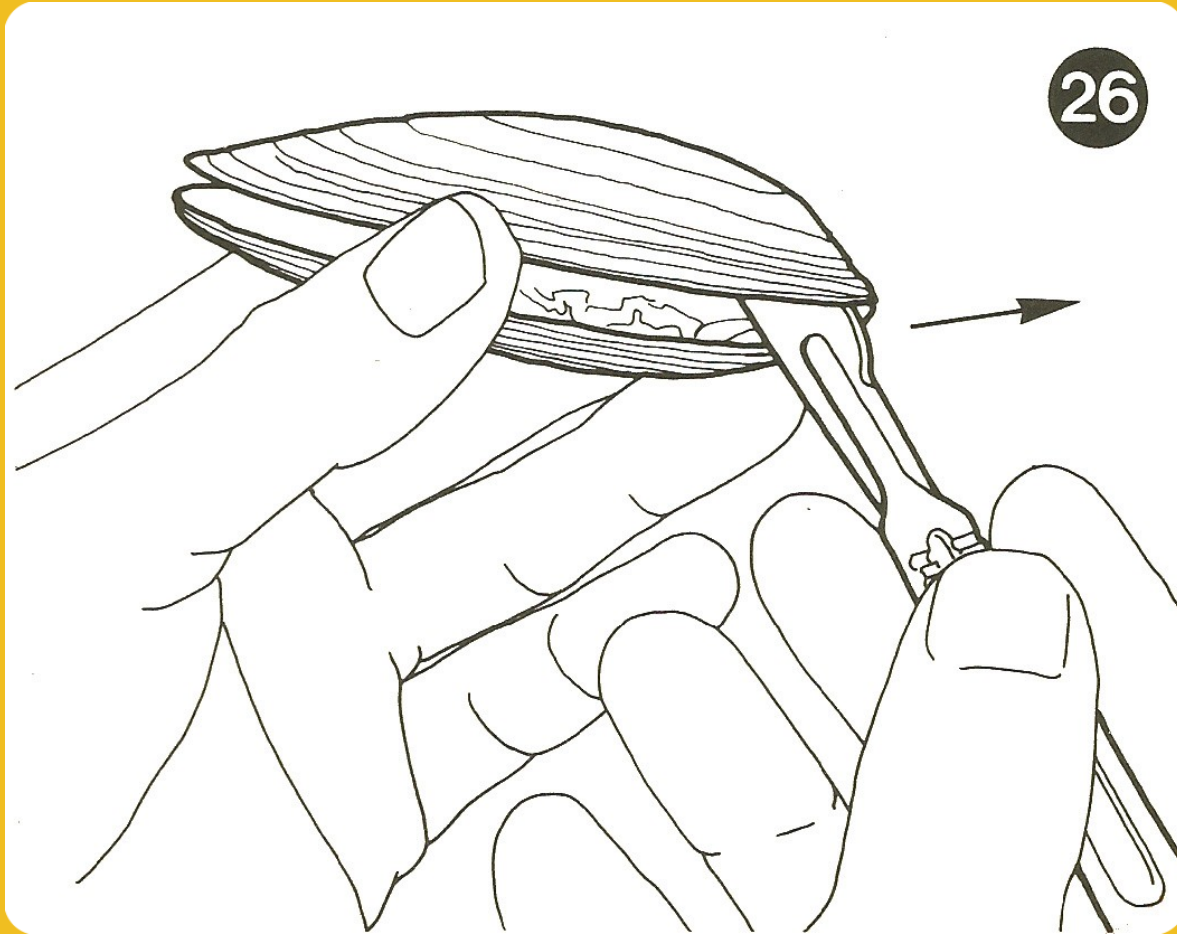
23. Internal anatomy (female).



24. Gut displayed against black background.

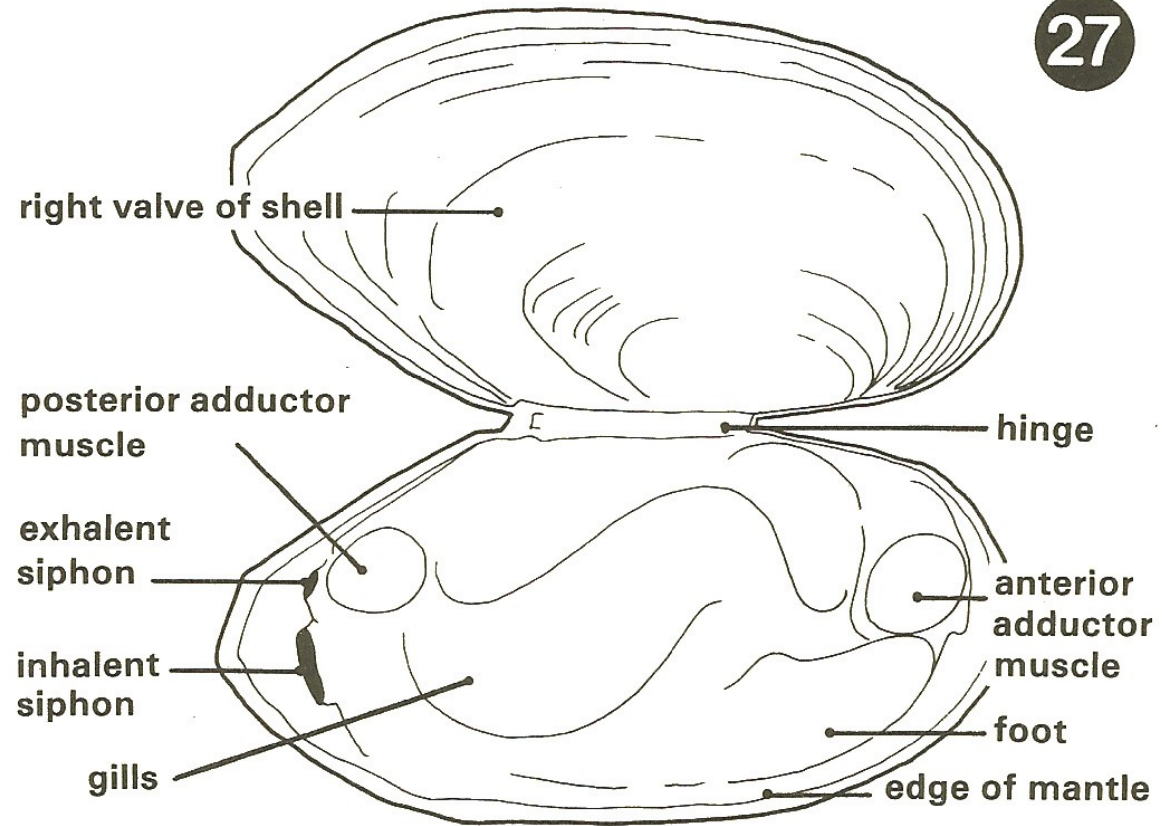


25. External features of the SWAN MUSSEL from right side.

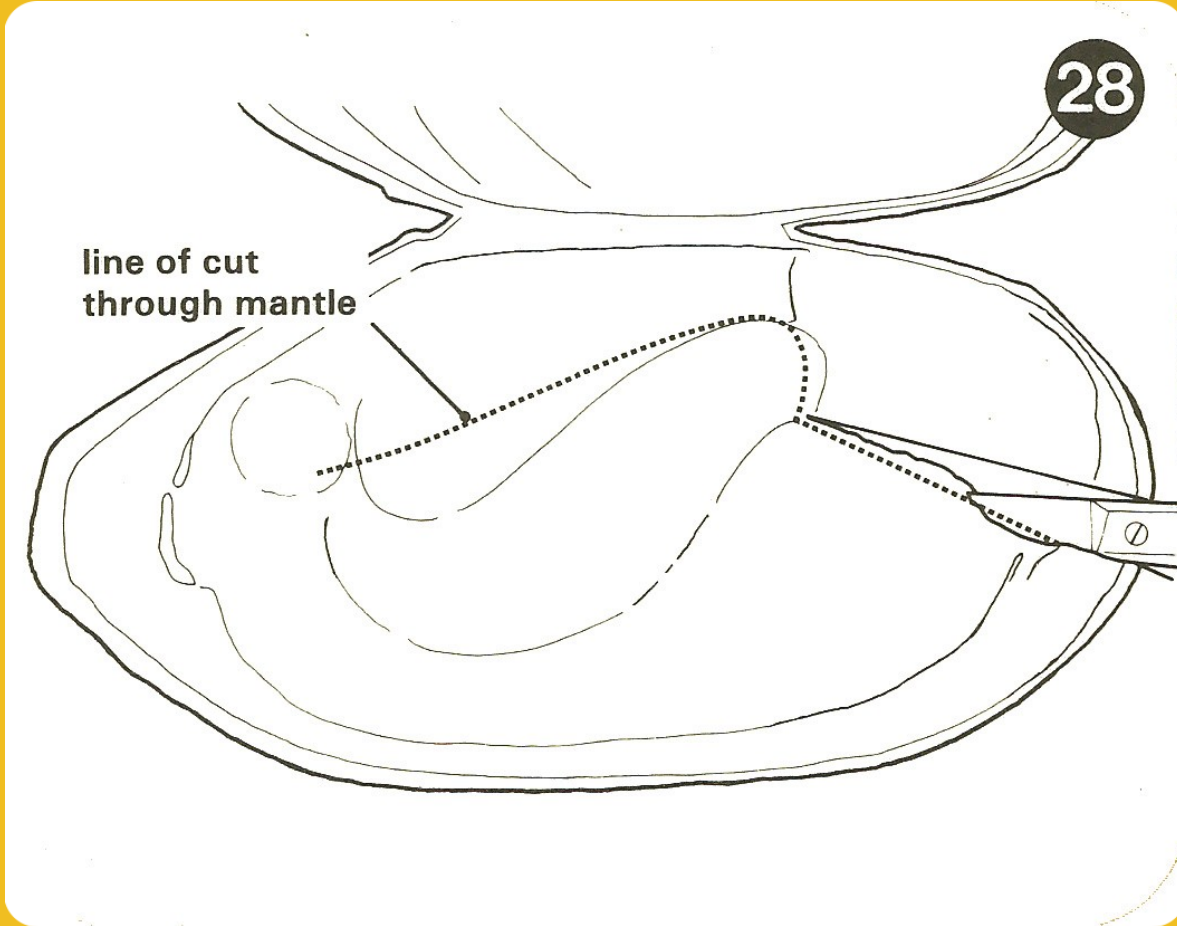


26. Wedge open the valves of the shell with the thumb. Insert the scalpel between the mantle and the upper (i.e. right) valve and ease it towards the hinge, cutting the muscles away from the upper valve. Repeat at the other end.

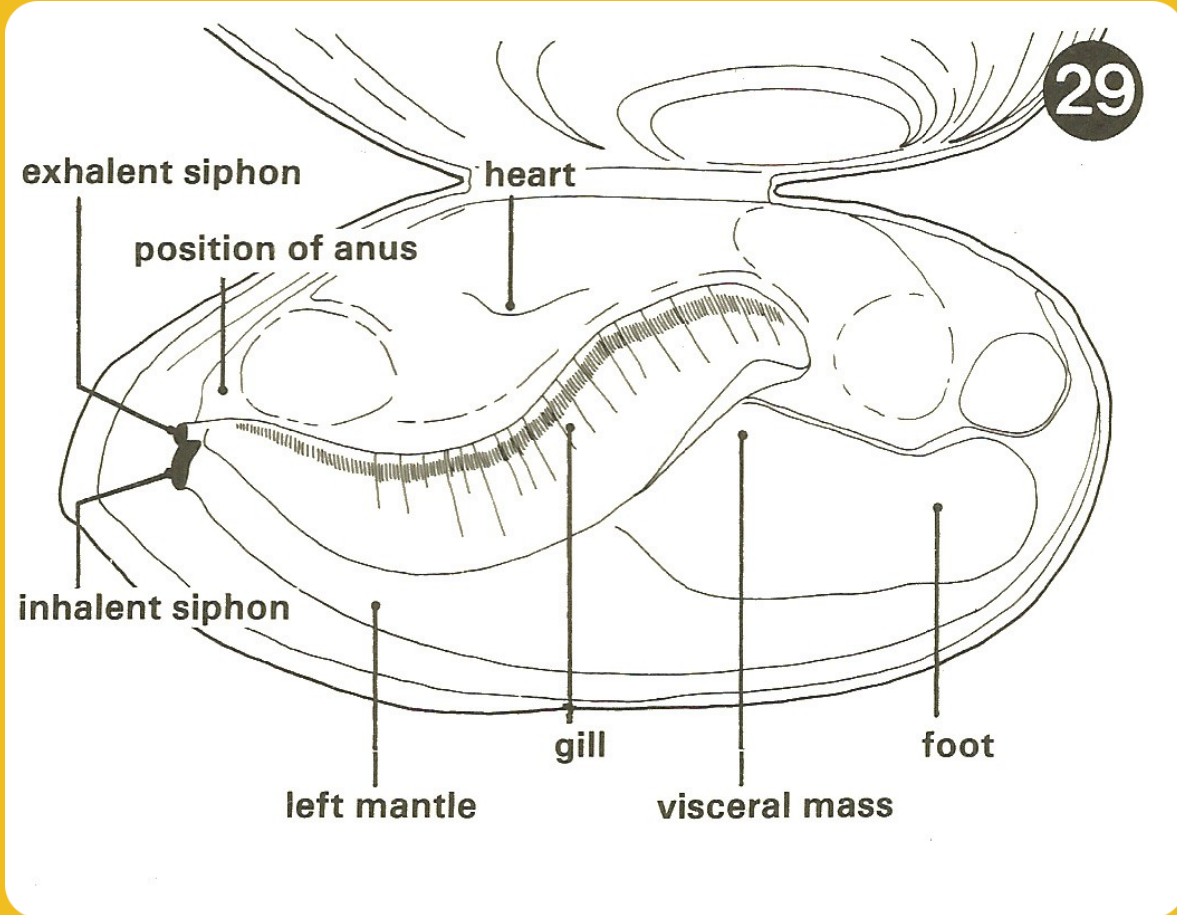
27



27. Open out the valves of the shell and observe the structures showing through the mantle.



28. Cut away the mantle (along the line indicated) to reveal the underlying structures.



29. Appearance with mantle removed.

INVERTEBRATE TEACHERS GUIDE

AIMS

The aim of this material is to provide students with a set of clear instructions for the basic dissection of some invertebrate types. The photographs enable the teacher to describe the necessary dissection techniques, and to identify some of the main structures, to a group of students as a whole. At the same time the photographs allow the students to become familiar with the structures to be seen during the dissection. The drawings and their captions in the dissection guide serve as guidelines for each student during the course of the dissection. The finer points of dissection and detailed anatomical identification will require individual guidance.

DISSECTION OF THE EARTHWORM

The photographs in this set are of *Lumbricus terrestris*.

FRAME 1.

Identify the ventral surface by feeling the chaetae. Make a dorsal incision with fine scissors and cut forwards as shown, keeping the scissor points well up. In a freshly killed specimen there will be some bleeding from the dorsal aorta.

FRAME 2.

Pin through the first segment, stretch the worm gently and pin through the body towards the posterior end. Starting from the anterior end, pin the body wall as shown, sloping the pins outwards and cutting the segmental septa with a fine scalpel.

FRAME 3.

Continue the dorsal cut and the pinning posteriorly. Cover the dissection with water. Note yellow chloragogen tissue covering the intestine, the white seminal vesicles, pseudohearts and cerebral ganglion.

FRAME 4.

Anterior structures in situ. Three pairs of irregularly shaped seminal vesicles can be seen. The small spherical structures are spermatheca (there are two pairs of these).

FRAME 5.

Hold the seminal vesicles away from the gut with pins pushed 'horizontally' into the wax.

FRAME 6.

Lift the gut somewhere behind the crop and, with a fine scalpel, gently free it from all underlying structures.

FRAME 7.

Displace the gut to one side to reveal the reproductive organs (the seminal funnels are now visible) and the ventral nerve cord. Remove the horizontal pins holding the seminal vesicles and identify as many structures as possible. A lens will be required at this stage.

FRAME 8.

Seminal funnels.

FRAME 9.

Cerebral ganglia at higher magnification.

DISSECTION OF THE LOCUST

The photographs in this set are of the Migratory Locust (*Locusta migratoria migratoides*). The other locust most commonly used for dissection is the Desert Locust (*Schistocerca gregaria*). In the Migratory Locust mature males are yellow and mature females are dark brown. In the Desert Locust, the immature adults are tinged with pink. As they mature, the pink disappears from the hind tibia and the mature adults become yellowish brown, with the males being the brighter yellow. For the purposes of a general anatomical investigation, the two species can be considered as being virtually the same.

FRAME 10.

Male and female (above) *Locusta*, external features. Note differences in colour, size and abdominal structure. The second and third thoracic segments each bear a pair of wings. The forewings each have a stridulatory vein, which is best seen in the mature male. When the stridulatory ridge on the inner side of the femur of the hind leg is rubbed against this, the locust produces its characteristic shrill sound (stridulation).

The first pair of thoracic spiracles are found in the membrane joining the first and second thoracic segments, and are usually covered by the hood-like dorsal exoskeletal plate (tergum) of the first thoracic segment. The second pair of thoracic spiracles are found at the rigid joint of the second and third thoracic segments. There are eight pairs of abdominal spiracles. The first are found in front of the paired auditory tympanal organs on the first abdominal segment. The others are visible along the sides of segments 2 to 8.

FRAME 11.

Female and male abdomens compared. The mature female is easily distinguished by the black ovipositor valves.

FRAME 12.

Second thoracic spiracle and tympanum.

FRAME 13.

Microscopic preparation of a spiracle with tracheae attached.

Method: Cut out a piece of body wall to include at least one segment with a spiracle - preferably either the second thoracic spiracle or the first abdominal. Examine under a binocular microscope, clearing away some of the soft tissue around the tracheae with mounted needles. The section may be boiled in 10% NaOH for about 15 minutes to dissolve away the soft tissue. Rinse and re-examine under water. The tracheae, with their bands of chitin, should be clearly seen branching off the spiracle. Alternatively use a caterpillar or water-beetle-the thinner body wall enables the tracheae to be seen more clearly.

FRAME 14.

Fix the locust to the wax by pins through the flat surface of the femur of the hind legs. Stretch the abdomen gently and pin through the last (10th) abdominal segment. Remove the wings by clipping off at the base with scissors.

FRAME 15.

Insert the point of a pair of small scissors under the abdominal terga on one side, making sure the abdominal cavity is penetrated. Extend the incision along the length of the animal right to the head and to the last abdominal segment.

FRAME 16.

Pin down the lower cut edge of the body wall, laying the pins away from the insect.

FRAME 17.

Carefully lift the dorsal exoskeletal plates with tweezers, gently freeing them from strands of tracheae, fat and muscles with a seeker or fine scalpel, and pin them down to the wax. Take care in the thorax, where the exoskeleton is thick and attached to the powerful flight muscles.

FRAME 18.

Complete the pinning and cover with water. Note the glistening air filled tracheae and air sacs, and the dorsal tubular heart which should be visible on the underside of the dorsal terga.

FRAME 19.

Cut through the ligaments on the front ends of the gonads and pin the gonads back to one side. Clear the gut of tracheae and fat bodies.

FRAME 20.

Abdominal dissection of male for comparison. The paired testes appear as a single cream-coloured structure.

FRAME 21.

Displace the gut to one side, displaying the ventral.

DISSECTION OF THE COCKROACH

The photographs in this set are of the American Cockroach (*Periplaneta americana*), the largest of our domestic species, which can reach a length of about 4cm. The Common Cockroach (*Blattella orientalis*) only reaches a length of about 2.5cm.

FRAME 22.

Ventral view of male (right) and female. The wings extend well beyond the end of the abdomen in the male but are shorter in the female. (The sexes in the Common Cockroach are easily distinguished, as the female has vestigial wings). The male also has two short pointed 'styles' on the last abdominal segment. Notice also the egg pod (ootheca).

FRAME 23.

Internal anatomy of the female. The dissection procedures are the same as for the Locust, but greater care is required in the turning back of the dorsal terga of the exoskeleton as they are much more delicate. Also, instead of pinning the cockroach out, it may be pressed into molten wax which is allowed to harden before commencing the dissection. The internal anatomy of the male is not shown as at this magnification the structure of the testes is not clear.

FRAME 24.

Gut displayed against black background.

DISSECTION OF THE MUSSEL

The photographs in this set are of the freshwater (Swan) Mussel (*Anodonta cygnea*).

FRAME 25.

External features from the right side.

FRAME 26.

Wedge open the valves of the shell with the thumb. Identify the position of the mantle under the upper valves. Insert the scalpel between the mantle and the upper valve and ease it towards the hinge, cutting the powerful adductor muscle. Repeat at the other end, thus freeing the valves.

FRAME 27.

Open out the valves of the shell and observe the structures showing through the mantle.

FRAME 28.

Cut away the mantle (along the line indicated on the drawing) to reveal the underlying structures.

FRAME 29.

Appearance with mantle removed.

